НОВЫЙ ОБОРОННЫЙ ЗАКАЗ. СТРАТЕГИИ

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THE NEW DEFENCE ORDER STRATEGY

Russian Military-Industrial Complex. The Renaissance

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Russian Military-Industrial Complex. The Renaissance

The complicated political situation, economic sanctions, and global crisis – these factors should have affected the industrial potential and financial performance of the Russian military-industrial complex, but eventually gave the opposite effect. Adverse initial conditions along with the need to overcome the existing negative trends transformed into growth impetus for Russian companies involved in production of arms and military equipment.

Perhaps, the presentation of the T-14 tank based on the Armata platform that took place during the Victory Day Parade in 2015 marked the beginning of the Renaissance for the Russian military-industrial complex. New Russian armored combat vehicles made headlines due to their innovative performance that was well known to experts.

Moreover, Uralvagonzavod presented the newest Kurganets-25 infantry combat vehicle and Bumerang APC based on the unified wheeled armored platform and able to drive on both land and water. At the International Military-Industrial Forum "Army-2016", Uralvagonzavod unveiled its new 120-mm artillery system Floks that combines long-range gun, howitzer, and mortar functions.

At "Army-2016", Kalashnikov Concern demonstrated its brand new military robot system Soratnik along with a new compact semi-automatic sniper rifle and the RPK-16 light machine gun. In fact, our distinguished arms manufacturer has to face tough competition with the brand "LOBAEV Arms", a Russian private gun manufacturer, in development of high-precision long-range firearms. Lobaev Holding Company is involved in design and production of long-ranged precision rifles with unique and occasionally breakthrough performance, as well as in development of ultra-modern robotic perimeter guard systems.

But the main attraction is the Russian Aerospace Forces. The theatre of military operations in Syria allowed to prove the combat effectiveness and accuracy for Russian fighters, bombers, military and civil helicopters. Global events are expected at Russia's market related to aircraft industry and aircraft armament in the nearest future. Recently, the 5th generation PAK FA fighter and 4++ generation MiG-35 fighter have made their maiden flights and passed flight tests. Russian Aerospace Forces are planning to increase their fleet up to 1,750 aircrafts for the next six years, including approximately 700 fighter aircrafts (40%).

The International Military-Technical Forum "Army" debuted in the "Patriot" park in the Russian town of Kubinka in 2015 is now crucial for improving the image of the national defence industry and development of military and technical cooperation. The Forum has became the most comprehensive and attractive exhibition to demonstrate achievements in all the branches of the national defence industry. Over 100 foreign delegations visited the Forum in 2016. Needless to say that this Forum is the perfect place for viewers from all parts of the world who must see state-of-the-art military products. ◆

Alexandra Grigorenko

06–25

26–59

LAND

60–81

SKY

Korolev silk factory

"PEREDOVAYA TEKSTILSCHITSA"

1875–2017

Front cover: Aerobatic performance team "Strizhi" (Swifts), Major Vassily Dudnikov, flight commander. Photo by Alexander Shukhov

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ALEXANDER STADNIK,
TRADE REPRESENTATIVE OF THE RF IN THE USA
"Deliveries of the Russian amphibian Be-200ChS to the USA may begin in 2018. There is a great interest to it in the USA and it is a receptive market for our plane. But this is a project that requires political stability. Business needs confidence that its investments are protected, and these are big investments"

RUSSIA'S ARMS SALES RISING WHILE AMERICA'S DROP
(CNN, USA)

Sales of arms by American defense companies have declined for the fifth consecutive year in 2015, while European firms saw their sales jump.

Despite the drop, U.S. companies are still dominating the global arms market, selling $209.7 billion worth of arms in 2015, according to the Stockholm International Peace Research Institute. That's 3% lower than in 2014, but still 56% of arms sales globally, as documented by the institute.

The data show European and Asian arms producers are slowly eating into U.S. market share.

Russian arms sales grew 6.2% in 2015, after skyrocketing over 48% in 2014 and 20% in 2013. Russia is investing heavily in upgrades to its military capabilities. President Vladimir Putin plans to spend more than 20 trillion rubles ($700 billion) bringing equipment up to date by 2025. It now accounts for 8.1% of sales globally.

Sales in Europe are also rising. French defense companies saw sales grow 13% compared to 2014, thanks to big deals with Egypt and Qatar, while companies in Germany boosted sales by 7.4%. Even British companies saw modest increase of 2.8% in 2015 after a drop in 2014.

China's military spending increased more than fivefold in real terms between 2000 and 2015, and the country has engaged in major efforts to develop its domestic industry. In addition, China's arms exports have grown substantially in the past decade. ◆

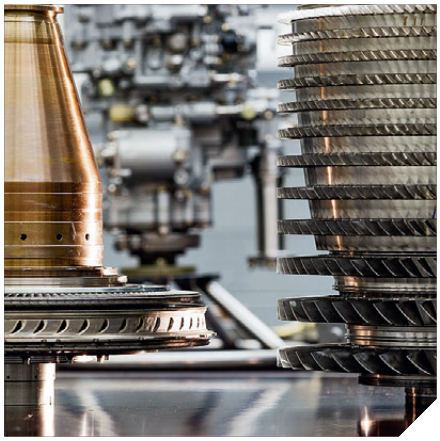
EXPORT DELIVERIES OF KA-52 HELICOPTERS WILL BEGIN IN 2017
(ITAR-TASS)

The first export deliveries of the combat Ka-52 "Alligator" scout attack helicopters will begin in 2017. This information was received in the press service of Russian Helicopters Holding Company.

Alexander Mikheev, Chief Executive Officer of Russian Helicopters Holding Company advised earlier that Russia had closed a contract with Egypt for a delivery of 46 Ka-52 "Alligator" helicopters.

"In 2017 the deliveries of these rotocraft vehicles will continue in the framework of the state defense order as well as the first deliveries of Ka-52 export prototypes to the foreign customers will begin. The efforts on manufacturing these prototypes are in progress already," the statement said.

Ka-52 "Alligator" scout attack helicopter is intended for killing tanks, armoured and non-armoured combat equipment, troops, helicopters and other enemy's aircraft at the frontline and in tactical depth, day and night under any weather conditions as well as for solving other problems. ◆



UEC HAS BEEN INCLUDED INTO TOP HUNDRED OF THE BIGGEST WORLD ARMAMENT MANUFACTURERS ACCORDING TO SIPRI VERSION
(WWW.AVIATIONUNION.RU)

United Engine Corporation (belongs to Rostec State Corporation) has been included into a rating of 100 world-biggest armament manufacturers and suppliers of military services compiled by the reputable Stockholm International Peace Research Institute (SIPRI) by the results of 2015.

UEC occupies the 50th position in SIPRI's TOP-100. According to the Institute's data, the volumes of military sales of the Corporation in 2015 exceeded $1.7 billion.

UEC is the development agency and manufacturer of engines for the military planes and helicopters as well as for rocket technology and the Navy ships.

In particular, the Corporation manufactures the AL-41F-1S turbojet engine for Su-35/Su-35C fighters, RD-33MK turbojet engine for the family of MiG-29 fighters, AI-222-25 turbojet engine for Yak-130 trainer, VK-2500 turboshaft engine for the majority of helicopters of "Mi" and "Ka" type, etc.

Since December 31, 2014, UEC is in the possession of a license for the right to carry out the foreign-trade activity regarding military produce in terms of after-sales maintenance and repair of aircraft engines. Thus, the Corporation works abroad both under the auspices of Rosoboronexport and entities of military and technical cooperation, and independently. ◆

“Almaz – Antey” in Iranian Civil Aviation

“ALMAZ – ANTEY” AIR AND SPACE DEFENCE CORPORATION” (RUSSIAN FEDERATION) AND “SHIRAZ ELECTRONICS INDUSTRIES” (ISLAMIC REPUBLIC OF IRAN) SIGNED AN AGREEMENT ON COOPERATION IN THE JOINT RESEARCH, DEVELOPMENT, MANUFACTURE AND SUPPLY OF GROUND-BASED AND AIRBORNE CIVIL EQUIPMENT AND COMPONENTS FOR COMMUNICATION, NAVIGATION, SURVEILLANCE AND AIR TRAFFIC MANAGEMENT (CNS/ATM).

The Agreement aim is to combine the resourses of “Almaz – Antey” Corporation” and “Shiraz Electronics Industries” to develop Iranian Air Navigation system and to promote joint research and development results in foreign markets.

“Almaz – Antey” Corporation, performing functions of the system integrator for modernization of technical equipment of the air navigation system in Russia, has accumulated vast experience in the implementation of complex infrastructure projects on turnkey basis. Our material and technical resources, scientific potential of subsidiaries and partner companies of “Almaz – Antey” Corp. allow us to offer to the international market integrated solutions for air traffic management and to implement complex, ambitious projects. When it comes to upgrading the technological capacity of the

Almaz - Antey
Corp.

national air navigation systems, this work involves the survey, design, manufacture, supply, and installation of technical equipment. It increases the level of air traffic safety and the airspace throughput capability, while boosting ridership; also, it provides lower operating costs for airspace users, and improves aviation weather forecasts accuracy.

“Shiraz Electronics Industries” (SEI) is the largest subsidiary of the state-run holding company of Iran Electronics Industries. Established in 1972, the SEI having about 40 years of considerable experience is well reputed as a major and reliable manufacturer of hi-tech electronic products.

Benefiting from experience and knowledge of highly educated personnel and well-equipped laboratories and facilities, the SEI deals with research, design, and manufacture of both military and civil products in technological fields like electro-optics and laser, radars, electronic warfare, avionics, and sonar and marine electronics. ◆

"Military-technical cooperation between Russia and India is at a high level – we do not just sell advanced weapons to India, but are also engaged in joint development. S-400 "Triumf" means billions of dollars in transactions. What's more, you know that we are going to improve the "BrahMos" missile system, and will make it a land-, air- and sea-based system. We agreed that we would work to increase the range of these systems. We will work together on the 5th generation T-50 aircraft"

PRESIDENT OF RUSSIA VLADIMIR PUTIN

INDIA AND RUSSIA. LONG-TERM COOPERATION

This year, the total export portfolio of the Russian military-industrial complex (MIC) reached a record 52–55 (estimates vary) billion dollars. At the same time, for many years Russia has been confidently taking the 2nd place in the global arms market by the sales volume after the USA. India, which is the largest importer of weapons in the world, as well as Russia's largest export market, has played an important part in it.

Text
by Leonid Nersisyan, military analyst

According to the Stockholm International Peace Research Institute (SIPRI), in the period from 2011 to 2015, India accounted for 39% of Russian arms exports. And from 2000 to 2015, Moscow supplied to Delhi weapons worth $30 billion (with a contingent dollar exchange rate of 1990, greatly exceeding the present one). What has been done in recent years, and what are the prospects in the military-technical cooperation between the two countries?

RUSSIA HAS ALWAYS SUPPORTED THE CONCEPT OF "MAKE IN INDIA"

One of the reasons for the success of Russian arms in India was that Moscow has always been willing to work for "Make in India" concept, which Delhi has been promoting for many years. It is not a simple purchase of products (not necessarily only military ones), but the transfer of its production to India, as well as partial transfer of the production technology. This approach allows India to develop the industry and create new jobs, which are sorely lacking in the country. Meanwhile, the tiny, by world standards, cost of labor can also reduce the costs of production and save money. As for exporters – Delhi can afford to bargain from a position of strength (especially in the MIC), since it is always about the very large contracts. However, unlike Russia, not all countries are willing to work under such conditions. Combined with the fact that Russian weapons in most cases are much cheaper than Western ones, with some items Moscow succeeded to almost completely occupy the Indian market.

5TH GENERATION FIGHTER FGFA IS THE MAJOR RUSSIAN-INDIAN PROJECT

Perhaps the most successful deal for the Russian MIC in India has been the sale of multi-role fighters Su-30MKI – a two-seat upgraded version of the Russian Su-27, designed specifically with consideration

Moscow has always been willing to work for "Make in India" concept

tagesschau 24

"India is the biggest arms importer in the world, the country is spending dozens billions dollars for the modernization of the Soviet-era military equipment, trying to protect its borders from Pakistan, the main regional rival, and the increasingly active influence of China"

GERMAN TELEVISION CHANNEL TAGESSCHAU

"So far, we think we are the primary suppliers of arms and military equipment to the Indian market, and in terms of the latest contract – they fully compensated for the complete silence that occurred two or three years ago"

DEPUTY PRIME MINISTER DMITRY ROGOZIN

SU-30MKI (MODERNIZED, COMMERCIAL, INDIAN) IS A VERSION OF THE SU-30MK FOR INDIA

The first flight of the prototype took place in 1997. A multifunctional two-seat fighter with horizontal canards and engine with thrust vector control (AL-31FP), with avionics produced within the framework of international Russia – France – Israel – India cooperation, with a new radar N011M with a passive phased antenna array (PPAA) and the advanced "air-to-air" and "air-to-surface" weaponry.

of the Indian requirements (as evidenced by the letter "I" in the index). Most of the aircraft, as well as the T-90 tanks, are assembled under license in India. India will pay almost $12 billion for a total of 272 units of the Su-30MKI. Currently, the Indian Air Force already own about 230 fighters of this type in service; the end of supply is expected in 2018–2019.

The first contract for the supply of Su-30MKI, signed in 2002, in many ways helped to preserve the scientific and technological potential in the Russian military aircraft industry, and in particular the Sukhoi Design Bureau. Moreover, at the same time the modification of the Russian fighter Su-30SM has been created, which was praised by pilots. In recent years, these aircraft have been actively coming into service of the Russian Aerospace Forces. In addition, part of the proceeds went to the development of the Russian 5th generation fighter T-50 PAK FA (promising airborne complex of frontline aviation). It is this plane that forms the cornerstone for the future Russian military aircraft industry in the world arms market. And again, it is connected with India.

The thing is that the export version of the PAK FA is created by Russia and India. This plane is called FGFA (Fifth Generation Fighter Aircraft). Just like the Su-30, this machine is a two-seater – the Indian military prefer this approach, believing that two crew members can work better than one, especially when performing strike missions. The success of the FGFA project for the Russian MIC, and in particular the "United Aircraft Corporation" (UAC), is of paramount importance. Delhi plans to buy about 200 FGFA aircraft in the future. At the expected value of at least 100 million dollars per unit, the minimum UAC revenue will be $20 billion. And that's not taking into account the fact that the planes will need various types of weapons, service and spare parts, which will provide many defence companies with work orders for decades.

However, works on FGFA do not go as smoothly as expected – in 2010 the Indian party signed a contract for the detailed design of the aircraft worth about $300 million, after which all further progress on the project has stalled. The Indian press published various rumors that a Russian fighter jet, according to the local military, did not correspond to the stated technical-tactical characteristics. At different times, the claims were presented to the AL-41F1 engine (insufficient thrust), radar capabilities and the technologies to reduce radar visibility of the aircraft.

As it finally turned out, the problems were probably greatly exaggerated, since, according to the latest news, the next stage of works will soon be agreed upon, but the cost of the contract for research and development works (R&D) will be reduced by 40%. According to the available information, the parties agreed that Delhi and Moscow would invest 4 billion dollars in R&D. Furthermore, Delhi, through some hard bargaining, has also achieved

Delhi plans to buy about 200 FGFA aircraft in the future

FGFA (Fifth Generation Fighter Aircraft)

an increase in the number of parts, which will be produced in India – now their share is approximately 40%, as opposed to the previously announced 25%. However, due to the depreciation of the ruble, the cost of R&D should not hit hard on the UAC, and the prospect of billions dollars of profits allows looking at the FGFA project optimistically. Plus, the Indian market is too vast not to take its requirements into consideration. One thing is for sure – if the Russian-Indian 5th generation fighter is created and purchased in the expected quantities, the UAC enterprises will have been loaded with orders until at least the early 2030s, which will allow to develop production and create new planes.

T-90 TANK FULLY OCCUPIED INDIAN MARKET

In November 2016, it became known that the Government of India had approved signing of a new contract for the licensed production of 464 T-90MS tanks, the most modern modification of the vehicle, while Delhi became the launch customer for this tank. The contract value was approximately $2 billion, so, respectively, each T-90MS will cost the Indian budget at $4.3 million – almost twice as much as the previous modification of the T-90S (it costs $2.5 million). In total, India will receive 2121 T-90 tanks by both the previous contracts (1657 T-90S units) and the new agreement. This amount exceeds that of all other countries taken together (in Russia, for example, there are about 500 T-90 of various modifications).

The success of T-90, which has almost completely taken over the Indian market, can be explained by several reasons. First, it is the price that even for the newest T-90MS is markedly lower than that of its competi-

T-90 tank

Indian tank “Arjun”

T-90MS tank

In total, India will receive 2121 T-90 tanks by both the previous contracts (1657 T-90S units) and the new agreement

tors. The Western tanks cost 6.8 million dollars depending on the model and configuration. The cost of an Indian "Arjun" tank turned out to be about the same. Secondly, the weight of the T-90 is much lower than that of the Western tanks (due to the fact that an automatic loading device is installed in the Russian tanks instead of the fourth crew member), increasing its mobility and cross-country capability, which is very important in the Indian landscape. This is how the Indian military motivate the rejection of purchases of "Arjun" – it weighs a little less than 60 tons (T-90 weighs 46–48 tons, depending on version) and has problems with the reliability of track assembly. And thirdly, with the help of the Uralvagonzavod experts in India, a company has been created to assemble and manufacture some of the components of T-90.

Contracts for the supply of T-90 to India allow Russia to retain about 56% of world sales of new tanks. As for the future of the "armored" prospects – a lot will depend on the success of the project to create a new generation of the T-14 tanks on the heavy tracked "Armata" platform. In terms of costs, the T-14 is already comparable to Western armor, but if they are to achieve the stated performance characteristics, they will definitely be worth the money. At the moment, a pilot batch of 100 vehicles has already been ordered for the Russian army, which may imply that the tank really goes the way it was supposed to – with the "Afganit" active protection system that can shoot down even the approaching armor-piercing projectiles, as well as with the modern system fire control, powerful engine, etc.

Aircraft carrier "Vikramaditya"
(modernized heavy aircraft carrying cruiser "Admiral Gorshkov" from the Russian Navy)

INDIA BOUGHT RUSSIAN FRIGATES LEFT WITHOUT RUSSIAN ENGINES

The Ukrainian crisis, which began in 2014, led to the fact that Kiev, in spite of the heavy reliance of its military industrial complex on the Russian market, broke the military-technical cooperation with Russia. For Moscow, this situation was unpleasant, as many of the components for military equipment produced in Ukraine ever since the Soviet times had been purchased and installed on Russian products. However, Russian MIC was able to cope with the replacement of most of the components pretty quickly – gas turbine power plants for the Project 11356 frigates, built for the Russian Black Sea Fleet, became the only exception. Only three power plants were delivered for a series of six ships, so the first three ships were successfully built, and two frigates are still "twisting in the wind" without engines (one more was never laid down).

Delhi did not mind the purchase of these vessels, especially considering that the country had previously bought very similar products in Russia. The frigates of Project 1135.6 "Talwar" are precursors of the project 11356 and have been developed specifically for India in the early 1990s, after which Delhi bought six of these ships. Successful design of the ship motivated the Russian military to order a series of similar vessels for the Russian Navy. Delhi now purchased two unfinished ships (they will be finished in Russia), as well as two new ones that have to be built in India in the framework of "Make in India" program. Ukraine has agreed to supply engines to India. The big plus is the fact that the ships will be equipped with anti-ship missiles (ASM) "BrahMos" (export

In 2012, the K-152 "Nerpa" submarine was leased to India for a period of 10 years for 900 million dollars

Submarine of project 971 "Shchuka-B"

version of the missile P-800 "Oniks", designed specifically for the requirements of India). This line of ASM will soon be installed on the Su-30MKI, and in the future even FGFA. With regard to the naval theme – there were other large projects here: Delhi received a Russian aircraft carrier "Vikramaditya" (modernized heavy aircraft carrying cruiser "Admiral Gorshkov" from the Russian Navy). And a light aircraft carrier "Vikrant" (very similar to the "Vikramaditya") is being built together with the Nevskoe DB.

RUSSIA AND INDIA SIGNED AN AGREEMENT FOR AT LEAST ANOTHER $6 BILLION

During the last visit of the President of Russia Vladimir Putin to India in the framework of the BRICS summit, a number of new defense agreements was signed with India, the total amount of which is estimated at $6–8 billion. One of them we have already discussed earlier – the Project 11356 frigates. In addition to this important deal, agreements have been signed on the supply of four battalions of the advanced Russian long-range anti-aircraft missile systems S-400, a joint production of 200 multi-role Ka-226T helicopters (with an option for another 200 aircraft), as well as leasing another nuclear submarine of project 971 "Shchuka-B" (in 2012, the K-152 "Nerpa" submarine was leased to India for a period of 10 years for 900 million dollars). Most probably, India will have a nuclear submarine K-322 "Kashalot" delivered, which will be modernized in accordance with the requirements of Delhi, including equipment with "BrahMos" submarine anti-ship missiles.

STRONGER COMPETITION IN THE INDIAN MARKET

May we assume that the military-technical cooperation between Russia and India is perfect, and Moscow does not face virtually any complexities? Not necessarily. All the major exporters of weapons are actively seeking to infiltrate the "alluring" Indian market. Some even manage to boost competition – the USA and France significantly increased their share in the Indian market, largely due to the weakness of the Russian proposals for some items. For example, a MMRCA tender (Medium Multi-Role Combat Aircraft) was held in India, the winner of which was to deliver 126 light fighters. Russian MiG-35, which is a deep modernization of the MiG-29 and exists, in fact, on paper only, was not even considered seriously, having been out-grossed by the French Rafale fighter. However, the Indian government eventually purchased only 36 such aircraft, as the French gunsmiths revised the price, having driven it higher than that of the heavy Su-30MKI, and refused to provide the required volume of production technology. Thus, the Delhi's need for a light fighter is still there, but even now Russia has nothing special to offer – the MiG-35 is too expensive for a light fighter (largely due to the use of two engines), and there is no alternative to it.

Another problem project is the MTA (Multi-Role Transport Aircraft) – tactical military transport aircraft, which had to replace more than 100 legacy transport planes An-32 of the Indian Air Force, as well as the An-12, An-26, and An-72 of the Russian Aerospace Forces. The project promised great profits and huge volume of production, but the parties had been faced with a lack of understanding even before a single prototype was made "in metal". In 2015, India officially left the project. Judging by the publications in the media, the main problem was the differences between the parties regarding the engine of the aircraft – Russia offered to install the latest modification of the time-tested PS-90, while India demanded the development of a completely new engine, fitted with a full authority digital engine control (FADEC), which provides minimum fuel consumption. This loss is very annoying for UAC, because the MTA was needed by the Russian Aerospace Forces as well, and the economic crisis hampers the ability to create a machine with no external funding. Although, maybe this project is still waiting for a new round of negotiations, especially given the fact that India does not have many potential options – it has to purchase either a rather expensive American C-130, which is unlikely to be allowed to assemble in India, or a very bad European A-400M. ◆

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PRESIDENT OF RUSSIA VLADIMIR PUTIN

"The backlog of orders for supply of the Russian weapons abroad will be maintained at the level exceeding $50 billion. In this respect our country occupies with confidence the second place in the world, we outpace France, Germany, Great Britain in the group of five leaders," was pointed out. "In this case we act under traditionally tough competition conditions, and sometimes we encounter even the inequitable conduct of some partners"

INDIA AMONG WORLD'S TOP 5 DEFENSE SPENDERS

(DEFENCENEWS.IN, INDIA)

India is among the world's top five defence spenders with its military budget at USD 50.7 billion, overtaking Saudi Arabia and Russia. The US, China and the UK remain the top three defense spenders while India has the fourth largest military budget, followed by Saudi Arabia and Russia, according to the '2016 Jane's Defense Budgets Report', released by research firm IHS Markit.

India spent USD 50.7 billion this year on defense, up from USD 46.6 billion last year. The report said that India is set to overtake Britain with the third-largest defense budget by 2018 as a result of its modernization drive.

The US remained way ahead of the world with a budget of USD 622 billion, followed by China at USD 191.7 billion while the UK spent USD 53.8 billion on defense this year, Saudi Arabia USD 48.68 billion, and Russia USD 48.44 billion.

The worldwide outlook shows that global defense spending rose by 1% to USD 1.6 trillion this year, against 0.6% in 2015. ◆

THERE'S ONE KEY DIFFERENCE BETWEEN THE SECOND WORLD WAR AND THE SYRIAN CONFLICT – THE REBELS OF ALEPPO ARE NO HEROES

(INDEPENDENT, UK)

No-one doubts that foreigners are fighting alongside Jabhat al-Nusra/ Al-Qaida and the Salafist Ahrar al-Sham and other groups around the city. But, oddly, that's not what we call them. We refer to them as 'rebels' – as if they were the Maquis fighting in the French resistance or Partisans freeing Yugoslavia from the Nazis or, indeed, the insurgents of Warsaw struggling for freedom from the German SS. Which they clearly are not. And while we know that the 'rebels' of eastern Aleppo have died fighting bravely, we also know that they have executed their internal enemies, slit the throats of their prisoners and that – well, since Jabhat al-Nusra is al-Qaida (and has since changed its name yet again) – they have flown passenger aircraft into very tall buildings in New York. ◆

CHINA IS GETTING READY TO TESTING ANTI-SATELLITE MISSILE

The Chinese People's Liberation Army will perform testing of the cutting-edge anti-satellite missile Dong Neng 3 (DN-3). The American intelligence service has announced about impending missile testing. The analysts have arrived to such a conclusion because China had closed the airside encompassing the expected trajectory of missile flight. Besides, an "activity has been revealed at one of military facilities" in the central part of the country.

Dong Neng 3 belongs to the third generation of Chinese anti-satellite complex intended for killing space vehicles on elevated orbits by a direct hit. Dong Neng is translated from Chinese as "kinetic energy". The first test of DN took place in 2007, a missile launched from the territory of the PRC broke the outdated Chinese satellite into pieces. ◆

DONALD TRUMP

"If we cannot be properly reimbursed for the tremendous cost of our military protecting other countries, and in many cases the countries I'm talking about are extremely rich. Then if we cannot make a deal, which I believe we will be able to, and which I would prefer being able to, but if we cannot make a deal, I would like you to say, I would prefer being able to, some people, the one thing they took out of your last story, you know, some people, the fools and the haters, they said, "Oh, Trump doesn't want to protect you." I would prefer that we be able to continue, but if we are not going to be reasonably reimbursed for the tremendous cost of protecting these massive nations with tremendous wealth, – you have the tape going on?"

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PRESIDENT OF RUSSIA VLADIMIR PUTIN:
"Soft power" has long been considered the forte of American diplomacy. It is an imperceptible, intangible spread of affection towards the USA among the population of other countries, when the foreign culture, foreign values are perceived as original ones. At the time, cultish jeans, fast food, and Hollywood fairytales helped to undermine the Soviet way of life."

COLOR REVOLUTIONS – A FINAL TOUCH IN THE GLOBALIST IDEOLOGY DEFAULT

As of today, the strategic advantage given to Washington by a social technology of "soft power" has worn thin. But this does not mean that the USA will abandon new attempts to use this tool in planning the new color revolutions.

MULTI-SECTOR CRISIS

Representatives of the Western political establishment tend to increasingly recognize that the geopolitical system built in the late 20th century is going through a severe crisis, the consequences of which are difficult to predict. And there is nothing surprising in these confessions. The current balance of power on the world stage

GERMAN MINISTER OF FINANCE WOLFGANG SCHAUBLE: "Vladimir Putin is worried not about the expansion of the European Union or NATO, but the "soft power" of Europe moving closer to Russia's borders."

RUSSIAN MINISTER OF FOREIGN AFFAIRS SERGEI LAVROV: "The attempts to impose their own recipes of internal changes on other people, not taking into account their traditions and national features, to engage in "exporting democracy", have a destructive effect on international relations and lead to the increase of hot spots on the world map".

The current balance of power on the world stage is fundamentally unlike the expected one

is fundamentally unlike the expected one, shared in the 1990s by the winners in the Cold War. Meanwhile, a few decades ago, the Western victory seemed fair and square, achieved through better organization of the economy, more advanced technologies and a more flexible system of motivation of allies.

However, today's speeches on the crisis are mainly aimed at assessing the economic situation. First of all, the attention is focused on the issue of the excessive, to put it mildly, USA debt, which came close to $20 trillion.

"The Americans are quickly getting poorer, and it is ever more difficult to hide. Statistics demonstrate this vividly: in a total volume of goods and services produced in the USA the share of wages has fallen to historic lows. According to the American experts, the level of prosperity of the American middle class fell back to the level of 1958," says Vladimir Yakunin, PhD (Political Sciences), Head of Department of Public Policy at the Lomonosov Moscow State University[1].

Experts working outside the pro-Western information field, talk about this crisis in a much freer manner and suggest considering it more broadly: apart from economic perspective, in political and cultural science perspectives as well. "Today it has become clear that the expectation of universal peace based on shared democratic values and full realization of the principle of cooperation in international law had been an illusion," says Dmitry Pashentsev, Professor of the Department of Theory and History of State and Law at the Moscow State Pedagogical University[2].

The political default of the system of Western values is perfectly exemplified by how the USA is trying to build relations with China in the new realities. For example, in October 2015 Washington insisted on signing the agreement on the Trans-Pacific Partnership, which included the USA, Japan, Malaysia, Vietnam, Singapore, Brunei, Australia, New Zealand, Canada, Mexico, Chile, and Peru. But not China.

Beijing responds with the general change of the vector of international development. "Pacific direction is being changed to Asian, but a broad belt of potential and actual tension appears between China and the USA allies. Territorial disputes in the South China Sea, as well as disputes with Japan are only the first harbingers of future conflicts," says Vladimir Yakunin.

The political default of the system of Western values is perfectly exemplified by how the USA is trying to build relations with China in the new realities

The confrontation points have already been mentioned: in addition to the territorial claims, it is a competition for the production of steel and aluminum, intellectual property matters, bans on investment in strategic sectors. "The USA and China have begun a race to edit genes", "China will outrun the USA in the number of nuclear reactors in 10 years", "China will respond to the US missile defense deployment in South Korea", the politicized media headlines savor the widening conflict of interests.

IMPOSING THE AMERICAN ORDER AS A GOAL IN ITSELF

If we agree with the assessment that the current world order is undergoing a protracted crisis, the main reasons pushing the USA to "export democracy" become clear. There are at least three of them.

The first one is financial. Washington is simply forced to export tension to the outside world and artificially "fuel" conflicts around the world as a way to "write off" the accumulated debt. And for that it is necessary to see opponents in all areas of the world where the dogmas of the Department of State are put under a slightest doubt.

"Even the modern post-Soviet Russia is still under suspicion of the West as a potential "troublemaker" in the entire non-Western world. If, for example, the mighty China is seen today only as an economic and – potentially – a military competitor or opponent, then Russia is still expected to provide ideas that can confuse the minds in the West," notes Konstantin Kosachev, Cand. Sc. (Law), Chairperson of the Council of the Federation Committee on Foreign Affairs[3].

At the same time, the USA propaganda machine, living by the rules of self-generation, requires more and more new hostile characters. Otherwise, there is a risk of loss of spectators' interest. Accordingly, the second (culturological) reason is the need to find the global villains and to endow the elected regional leaders with grotesque features of such monsters.

The crisis is forcing the Western model to exist by the "law of the bicycle". They cannot stand still, they need either to move or fall. More precisely – the system can exist only as long as it has an advantage over its neighbors. As soon as the inequality sinks into oblivion, the foundations of the system will collapse. "Fixation of the global inequality, imbalances in the global distribution of resources and wealth is becoming one of the most important foreign policy objectives of the West in order to maintain its lead over the rest of the world for as long as possible," says Konstantin Kosachev. "Soft power" of the West in practice inhibits any alternative solutions in the world, causing potential competitors to feel inherently flawed compared with a highly developed part of civilization, and as a result, give it a notorious superiority and rightness in international affairs. And a "hard power" begins to manifest itself as a guardian of this situation, stopping any attempts of self-organization of the international community on the other, multipolar – or rather polycentric – principles".

Simply put, the USA cease, not only financially, but also ideologically, to be a self-sufficient power. Any enemy becomes necessary for Washington as a remedy, as a survival tool. Only the presence of foreign, albeit fictional, enemies helps the country to stay afloat.

SUPPOSEDLY NONVIOLENT GLOBALIZATION

Thus, a nexus of "color revolutions" that has swept across the planet turns out to be a symptom of the disease for the West – a symptom of the crisis. This does not mean that in the future the US efforts to continue imposing its world order would be "painfully" weakened. On the contrary, the chosen policy leads to an increase in the number of "disease sites".

It's another matter that the disease will increasingly mimic the common cultural values. And the resources of "soft power" are used as the main tool of such mimicry.

Any enemy becomes necessary for Washington as a remedy, as a survival tool

The crisis is forcing the Western model to exist by the "law of the bicycle". They cannot stand still, they need either to move or fall

As explained by Alexander Naumov, Cand. Sc. (History), Associate Professor of Public Administration Faculty of the Lomonosov Moscow State University, "soft power" is the ability to achieve goals in the international arena through persuasion and gaining foreign affection. It is the spread of influence of one state to the other by means of mass media, popular and high culture, provision of education services, favorable economic environment, amplification of attractive humanitarian and political ideals, its own original system of values that the other international entities would like to import.

"Soft power" has already had a significant impact on the development of international processes and the course of world history, especially during the last quarter of a century. It played a pivotal role in the collapse of the USSR, and later gave birth to the concept of "democratic intervention", "responsibility to protect" and "human security", has become the script core of "color revolutions" and the "Arab Spring", says Alexander Naumov[4].

Many political analysts add that almost all conflicts of modern times, be it Kosovan, Georgian, Ukrainian or Syrian ones, are portrayed as conflicts of values. It is quite understandable: one thing is a clash of geopolitical or economic interests, and quite another – countering the "wrong" values with the "right" ones. In fact, it looks like a stand between the obvious good and the notorious evil.

Then again, the "hand of Washington" can be seen in all conflicts of recent times. More specifically, the behavioral strategy of the USA, as well as the countries moving in its wake in terms of foreign policy, constantly demonstrates the fact that the "soft power" of the West does not promote the notorious Western values and only serves the vested interests of the ruling elite of the West.

This, for example, is indisputably shown by the events of the "Arab Spring". Moreover, many experts are confused by the hard-hitting conclusion that countries that are democratic in their internal structure do not necessarily advocate democratic relations in their foreign policy.

Meanwhile, such manipulation of values is so much stuck in everyone's throats that it is losing supporters even in the United States proper. "Realism again takes precedence over ideology. At this time it takes over the messianic globalism inspired by the Wall Street banks, pharmaceutical companies, private military companies, dishonest members of the media, expensive universities stuffing the students of economic departments with mathematized nonsense, and the like," summarizes Alexander Salitsky, PhD (Economy), Chief Scientific Officer of the Institute of World Economy and International Relations of the Russian Academy of Sciences[5]. "I stress that despite the personality of Donald John Trump, his rise to power is quite natural, as is the desire of the overwhelming majority of the planet population to drastically change their lives for the better and find at least some hope for a better future for their children."

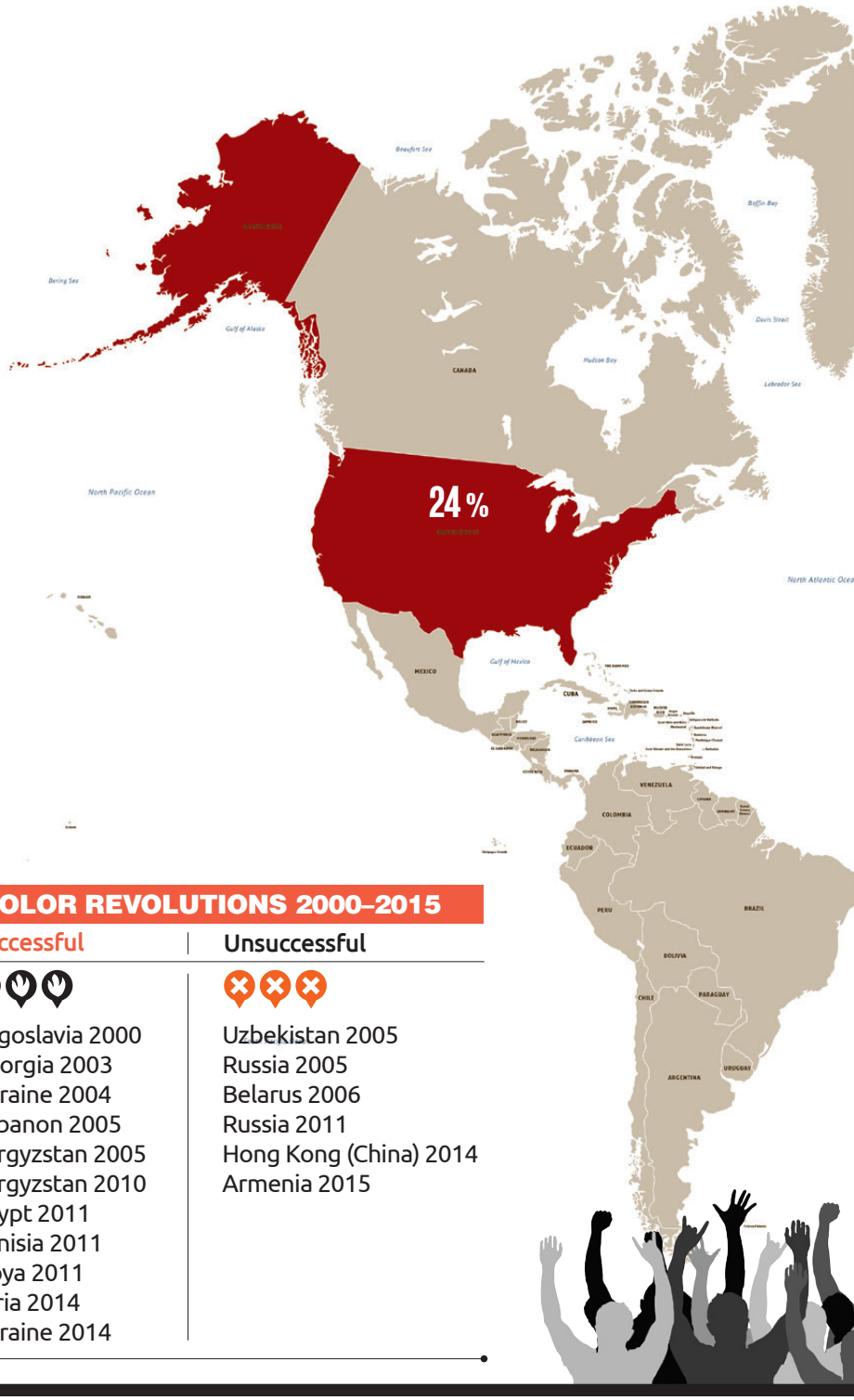
Nevertheless, we must be prepared that Washington will never voluntarily give up its chosen path. Within the framework of the crisis it has very few resources to maneuver.

COLOR REVOLUTIONS AT THE EUROPEAN THRESHOLD?

"The process of globalization that has determined the main vector of development of the world economy and trade in recent decades, began to slip," agrees Pyotr Yakovlev, PhD (Economy), Director of the Center for Iberian Studies at the Institute of Latin America (ILA) of the Russian Academy of Sciences, professor of the Plekhanov Russian University of Economics[6]. "The first signs of deceleration showed themselves during the crisis

THE WORLD THAT TALKS ABOUT RUSSIAN THREAT...

The results of the survey conducted by the Gallup International Research Centre in 2014. 70,000 people from 65 countries were interviewed. Distribution of answers to the question "Which country do you think poses the greatest threat to the world?" (%)



COLOR REVOLUTIONS 2000–2015

Successful	Unsuccessful
Yugoslavia 2000	Uzbekistan 2005
Georgia 2003	Russia 2005
Ukraine 2004	Belarus 2006
Lebanon 2005	Russia 2011
Kyrgyzstan 2005	Hong Kong (China) 2014
Kyrgyzstan 2010	Armenia 2015
Egypt 2011	
Tunisia 2011	
Libya 2011	
Syria 2014	
Ukraine 2014	

The Ebola virus, the Russian threat, and the international jihadism... That's how President Obama assessed the key challenges to global security two years ago. He was 33% correct. The virus was "snuffed out" back in 2015, when neither the American nor the Russian vaccines completed the test cycle and were ready to be produced commercially. But "threat No. 2" turned out to be the only sane player in the world, who has been consistently and effectively stopping the threat No. 3.

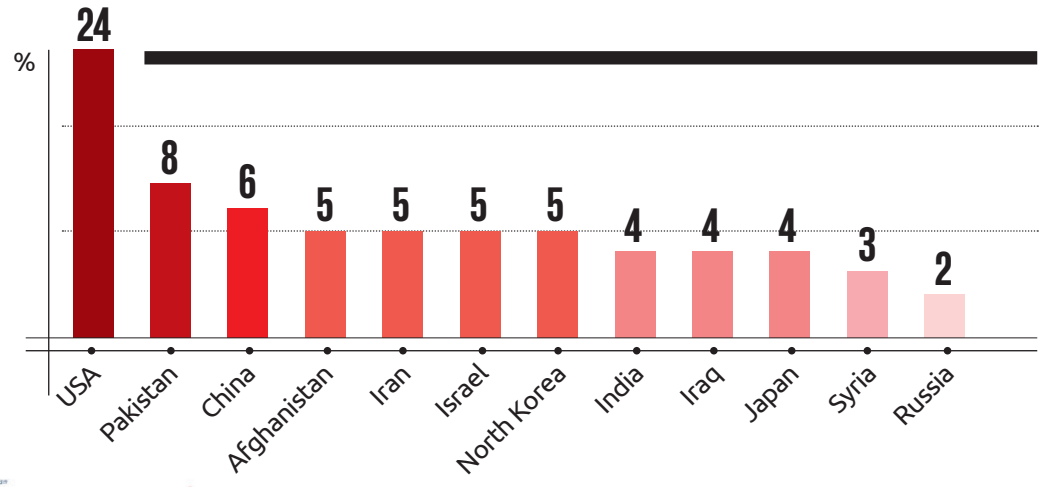
Yes, we, of course, pay tribute to the Herculean efforts made by the US administration in the way of demonizing Russia and suggesting irrational terror to the residents of old Europe. The process is underway; it has developed cruising speed and gained considerable momentum. Sometimes Brussels' fears go beyond politics and arouse genuine sympathy, as in the case with the recent resolution of the European Parliament on countering Russian propaganda.

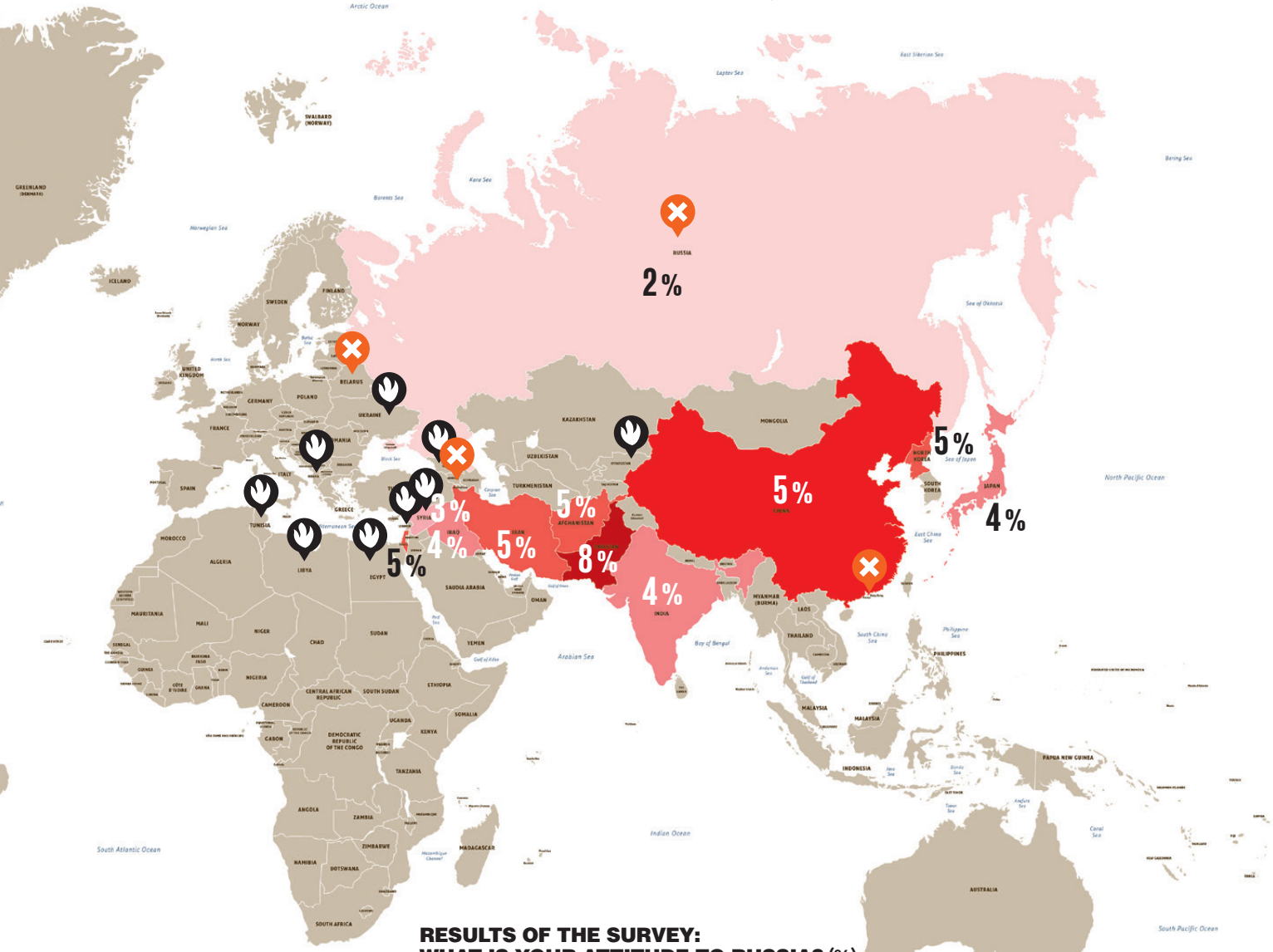
All the more interesting today is to look at the survey of the Gallup Institute (not a part of "Russia Today") conducted two years ago, when, answering the question "Which country do you think poses the greatest threat to the world", the world clearly said: "The United States of America" (for details, see next page). Why, really?

I cannot predict how the diagram of responses is going to look, say, in 2018, but I am absolutely sure that it is Russia that is being carefully considered by many countries and nations not as a threat, but as a strategic partner that can efficiently, diversely and consistently work for their safety in particular, and for the overall balance of interests in the world in general. Here we possess a totally unique experience.

Alexander Pylayev

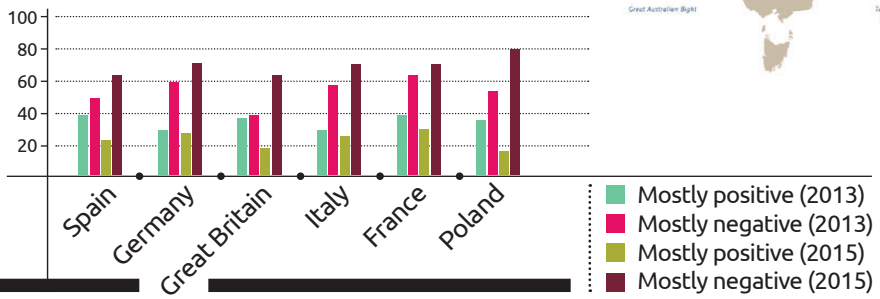
70,000
PEOPLE FROM 65 COUNTRIES WERE INTERVIEWED



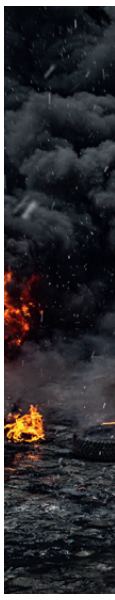


RESULTS OF THE SURVEY:
WHAT IS YOUR ATTITUDE TO RUSSIA? (%)

SOURCE: PEW RESEARCH CENTER, SEPTEMBER 2013 – AUGUST 2015



US allies deprive themselves of independence, which is bound to cause protests from the population



of 2007–2009, when dozens of countries have resorted to protectionist measures in an effort to protect domestic producers from foreign competition".

Meanwhile, the use of "soft power" by Washington leads not only to local success and political instability in some regions. US allies deprive themselves of independence, which is bound to cause protests from the population.

The unintended consequence of the policy of multiculturalism is a violation of political stability in the European countries that have seemingly long forgotten what social protests look like. A frightening evidence of ripening protests is the growing popularity of extreme right-wing political movements. They take the top lines in the polls. In Germany, it comes to the formation of self-defense militias. And all this is happening against the background of a tacit ban on public discussion of inter-ethnic clashes.

Nevertheless, in spite of total silence, there is an unprecedented increase in the popularity of non-parliamentary, extreme left and extreme right, and even the ultra-right parties, closed with a fascist ideology. In Spain 20.7% of the votes were cast for the "Podemos" party in the parliamentary elections of 2015, in Italy 28% of respondents are ready to vote for the anti-globalization advocates and eurosceptics from the "Five Star Movement", and 15.5% support the right-wing eurosceptics of the "Northern League", in Germany 11.5% support the party of eurosceptics "Alternative for Germany"...

"We are witnessing a political dogmatism contradicting not only the economic laws, but also the laws of nature. And the recession gives rise, among other things, to general political instability: the mere existence of this vicious circle is very little comprehended," judges the expert. "The most far-sighted representatives of the Western political elites are already talking about the fact that the liberal-democratic model fails".

A quotation of the famous political scientist Jacques Attali will be in order, according to whom the changes are vital, "until the crisis has gone so deeply that nobody can trust the market and democracy will be unable to cope with the "golem" it has created"[7].

But the USA strongly inhibits changes. Manipulation techniques honed on the real and imaginary opponents inevitably give rise to the temptation to use them on allies.

And this is not surprising. After all, since the "color revolutions" are a symptom, there is a "threat of infection" of all objects exposed to the source of the disease. And this risk, ironically, is quite relevant for the European Union.

Moreover, the United States – by and large – do not need allies. This, for example, can be seen by how easily the bureaucracy of Brussels can be exhibited guilty when making unpopular decisions. Globalization "the American way" involves turning Washington into a single global center of power. Europe, followed by the Middle East, has found itself in a hostage situation.

RESPONSE MOVES

The clash of different paradigms in the European Union has significantly increased terrorist activity in Europe. But the media attacks of Washington keep going on everywhere along the borders of our country. Accordingly, the anti-terrorist opposition can be considered the first line of defense of the Russian Federation. And it is well understood in the Kremlin.

"In recent years we have seen the intensified efforts of different, sometimes public, forces to use various forms of extremism (from the conduct of "color revolutions" to wars and committing armed aggression) in order to achieve their local, regional or geopolitical goals," says Alexander Bastrykin, General of Justice, PhD (Law), professor, Chairman of the Investigative Committee of Russian Federation[8]. "In these circumstances, the main reference point for us is to link the work in the area of international relations with the solution of the country's security as closely as possible, to bring it as much to the real needs as possible".

In particular, a bill on the introduction of criminal liability of legal persons, without which Russia cannot perform extraterritorial prosecution of foreign organizations that finance terrorism and sponsor the destabilization of the political situation, as well as other transnational crimes committed on the territory of Russia, has been prepared. In fact, it is a tool to counter the instruments of "soft power" that have already infiltrated into Russian territory.

The second line of defense is the Russian own studies for the discussed issues. It should be noted that the theory and practice of the Russian political science systematically adopted the concept of "soft power" in 2011–2013. This tool has been identified on the basis of the analysis of the actions of those states that have most actively used it in their foreign policy.

And then the State program "Foreign Political Activity" approved by the Decree of the Russian Government No. 325-10 dated 15.04.2014 was complemented by a document titled: "The implementation of

activities in the fields of international humanitarian cooperation and international development assistance". This document had the status of an independent sub-program No. 3, and was largely a kind of a "road map" in implementation of national "soft power" potential in a number of directions.

Simply put, no state or group of states has a monopoly on "soft power".

But, of course, to maximize its efficiency, Russia's "soft power" must be backed by real force, for which the military-industrial complex is directly responsible.

META-REVOLUTION

No one doubts that the "color revolutions", just like any other socio-political phenomenon, have their clients, contractors, customers and beneficiaries both at the micro and macro levels. However, experts have questioned the sufficiency of such an explanation. They agreed that the high demand for a revolutionary approach, the success in carrying out a string of revolutionary upheavals, the high probability of their furtherance and easy availability of this tool lie not only and not so much in the power of mercantile and foreign interest, but in some much more serious power shifts – the processes of meta-social order.

It is, as noted by Vladimir Shultz, PhD (Philosophy), Director of Security Problems Research Center of RAS, and Sergey Bochkarev, Cand. Sc. (Law), Acting Head of the Laboratory of Political and Legal Studies of the Lomonosov Moscow State University, the fracture of traditional notions of integrity of the world, state, society and the individual that happened in the individual and public consciousness[9].

Their weakening or loss led to an emergence of fertile ground for revolutionary moods and manifestations as one of the ways to construct new wholes. Due to mainly latent character of those changes, most of the countries similar to Ukraine (Georgia, Kyrgyzstan, Moldova and others) have been overwhelmed by color revolutions, as the national legal means of monitoring did not work in the crisis situation. Human rights mechanisms intended for bonding of society and the preservation of its integrity did not fulfill their task. Their Achilles heel was the complete dependence on political prudence, readiness, and adaptability.

Surveillance means of the law enforcement could not keep track that internal contradictions, which for a long time had remained unresolved, came under the third parties' interest and began to be used by them as a convenient pretext for the destabilization of societies and eventually led to the collapse of some of the political regimes. The justice system was not ready for the fact that most social parameters have changed. At the moments of public stress the bureaucracy was unable to assess the scale of the threat, the format of the problems, to determine the agents and the extent of their activity. It came as a surprise to it that with little external influence the ever "smoldering" inconsistencies swiftly transformed into uncompromising contradictions and destructive conflicts. The government, in other words, had difficulties with the perception of communities living in the country and uniting their cultural, historical, economic, political and legal values, note Vladimir Shultz and Sergey Bochkarev.

Both those states that have already "fallen", and those which are still trying to resist the pressure of the new trends of the time faced such difficulties. Each of the latter will have to go through the relevant changes. That being said, the above-mentioned transformations concern not only public entities and their bureaucracies. At the same example in Ukraine, experts can make sure that a vast number of ordinary members of internecine processes encountered very similar problems. Many of them have expressed inability to measure the total of individual and collective interests. ◆

HIS HOLINESS THE PATRIARCH KIRILL OF MOSCOW AND ALL RUSSIA

"The Russian world is a very special civilization, to which belong the people who call themselves today by different names – Russians, Ukrainians, and Belarussians. Even the people who are not from the Slavic world, but who accepted the cultural and spiritual component of this world as their own can belong to it."

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"The capabilities of airborne forces activity under extreme conditions of Arctic latitudes have been tested in the course of application thereof at the North Pole,"
ANDREY SERDYUKOV, COLONEL GENERAL, COMMANDER OF THE AIRBORNE FORCES

"The maritime operations command control center for cargoes delivery in the Arctic Regions will be established in the best interests of the Ministry of Defense of Russia,"
ANTON FILATOV, HEAD OF OBORONLOGISTIKA COMPANY

UK MILITARY INTELLIGENCE ISSUES WARNING OVER RUSSIAN SUPERTANK THREAT
(THE TELEGRAPH, UK)

British military intelligence has issued a warning over a ground-breaking tank being developed by Russia, according to a leaked document seen by The Telegraph. The Ministry of Defense internal briefing paper raises doubts over the UK's ability to combat the threat posed by the Kremlin's new T-14 Armata tank. It also questions why the Government has no plans for a rival tank for at least 20 years.

The internal document, written by a senior Army intelligence officer, states: "Without hyperbole, Armata represents the most revolutionary step change in tank design in the last half century."

It adds: "Unsurprisingly, the tank has caused a sensation," and it goes on to question the failure of current defence strategy to plan for a new tank that can compete.

A prototype of the Armata was rolled out last year at the annual May Day parade in Moscow, prompting the commissioning of the five-page intelligence report. The tank is pioneering, according to the document, because of a revolutionary turret design that makes crew less vulnerable under fire. The tank is also reckoned to be lighter, faster and lower in profile than Western rivals.

The Russian Defence ministry announced in September that it had signed a contract for the delivery of the first 100 Armata tanks. Another 2,200 are expected to follow. ◆

THE RUSSIAN NAVY HAS BEEN MISSING ONE CRITICAL CAPABILITY (UNTIL NOW)
(NATIONAL INTEREST, USA)

The Russian Navy is developing a new unmanned rotary wing aircraft for its ships. The unmanned helicopter will be used for intelligence, surveillance, and reconnaissance (ISR) as well as targeting. The Russians have been somewhat lagging in the development of unmanned systems, which are increasingly becoming commonplace in most Western militaries.

"An unmanned aerial system of the helicopter type – designed for reconnaissance and target designation – is being developed for Russian naval aviation," a Russian Defense ministry spokesman told the Moscow-based TASS news agency.

There are no further details available about the Kremlin's new project, but it could increase the organic ISR capabilities of Russian surface combatants in the same way as Northrop Grumman's MQ-8B and its larger MQ-8C Firescout unmanned helicopters do for the United States Navy.

The Russians have the engineering skills to develop an effective unmanned rotary wing system, the real question is if the Kremlin will have the funding available to see the project through. Only time will tell. ◆

PRE-PRODUCTION PROTOTYPE OF MIG-35 MADE ITS MAIDEN FLIGHT

The first pre-production prototype of the advanced Russian light MiG-35 fighter has made its maiden flight.

The designing of MiG-35 was finished in spring 2016. The maximum takeoff weight of the plane equals 23.5 t with the length of 17.3 m, height of 4.73 m and wings span of 11.99 m. The fighter will be equipped with the upgraded RD-33MK engines.

The combat plane power plants can produce thrust of 5,400 kgf and 9,000 kgf in afterburner mode (52.9 and 88.3 kN, accordingly). The thrust/weight ratio of MiG-35 at the normal takeoff weight equals 1.03. The fighter can produce speed up to 2,400 kilometers per hour, while the range of its flight with external fuel tanks will be 3,000 kilometers.

The plane is armed with 30-mm gun GSh-30-1 and is equipped with ten stations for aircraft missiles and bombs with total weight up to 6.5 t. MiG-35 will be furnished with completely glass cockpit, "Zhuk-A" radar station with active phased antenna array and data sighting systems of the fifth generation. MiG-35 can capture simultaneously up to ten targets and fire simultaneously at nearly six of them. ◆

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"We have nuclear arsenals which are in a very terrible shape"
DONALD TRUMP, PRESIDENT OF THE USA

"US needs a new strategic bomber, a replacement for the Ohio class SSBN, a new long-range standoff weapon, a new gravity bomb, and a replacement for Minuteman"
GENERAL JACK WEINSTEIN

RUSSIA & USA. STRATEGIC NUCLEAR FORCES

LAND COMPONENT

The escalation of political standoff between Russia and the USA along with an active phase of modernization of the Russian nuclear triad has heightened public interest in Strategic Nuclear Forces (SNF) of the leading countries. In the nearest future, this interest will grow stronger because the US nuclear triad is now facing its modernization phase.

Text
by Alexander Ermakov, independent military expert

There are nine nations in the world that possess nuclear weapons (NW), such as the USA, Russia, Great Britain, France, and China possessing the NW legally while India, Israel, Pakistan, and the Democratic People's Republic of Korea possess it illegally – the first three of them have not signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), while the North Korea has withdrawn from it. Despite a significant reduction, nuclear arsenals of the USA and Russia considerably surpass other countries' arsenals. To discuss current and future nuclear arsenals of both countries, we shall overview the terms and conditions of the START III Treaty (Strategic Arms Reduction Treaty) because it drastically influences both countries' arsenals.

START III Treaty was signed in April 2010 and came into force in February 2011. The current treaty is to be terminated in February 2021, but may be extended under mutual agreement for five years. Experts nibble at the future of treaties related to reduction of offensive arms, but there are certain subjective difficulties (deterioration in relations) and objective difficulties – further reduction of strategic nuclear weapons increases the role of tactical nuclear weapons the use of which is not clearly stated in agreements, plus other countries-members of the nuclear club that have to be involved in the process of negotiations, and a growing role of anti-missile defence and advanced non-nuclear high-precision munitions. The benefit is that the discussion of the effective START III Treaty has already been started.

The START III objective is to reach the following levels by February 2018:

– 700 deployed nuclear delivery vehicles, i.e. the total amount of deployed ground-based intercontinental ballistic missiles (ICBM), submarine-launched ballistic missiles (SLBM) and strategic bomber aircraft;

– 800 nuclear delivery vehicles including non-deployed vehicles put into storage or intended for tests;

COLONEL GENERAL VIKTOR YESIN

"Russia is faced with the most complex task: while removing from active service carriers with exhausted lifespan, to get into line instead such an amount of new ones that would also make for the resulted difference of more than 170 units"

Peacekeeper Missile Warheads

"We can meet our missions today, but it is time when we need to make some decisions"
GENERAL ROBIN RAND, THE COMMANDER OF AIR FORCE GLOBAL STRIKE COMMAND

RS-24 Yars

– 1,550 munitions including warheads for ICBMs, SLBMs and strategic bomber aircraft. The latter are classified not only as a single nuclear delivery vehicle, but also as a single warhead component.

For now, according to published statistic data as of March 1, 2016, both parties are close to reach the required objectives while some levels have already been reached. Thus, the amount of Russia's deployed nuclear delivery vehicles totals 521 while the USA has 1,481 warheads. It is a paradox, but since September 2013 the amount of warheads in Russia's arsenal has continuously been growing – the explanation is that new missile systems equipped with multiple independently targetable reentry vehicle (MIRV) come into operation faster than old systems with single warheads are discarded. To get out of the limits specified in the START III Treaty, the Russian armed forces will not have to complete the modernization of its nuclear arsenal – in our tradition, this is a non-stop process, – but at least will have to intensify the process to remove obsolescent systems from operational status and replace them with better solutions.

Traditionally, Russia's SNF are based on the Strategic Rocket Forces (SRF), a land component of the nuclear triad. The fact that SRF are a separate military branch that reports directly to the General Staff of Armed Forces of Russia and to the Supreme Commander-in-Chief emphasizes their importance. Moreover, these forces are the first to undergo the process of modernization and they demonstrate the best results in this regard.

PEACEMAKING SWORD

No accurate data on the SRF size and amount is published in Russia, but the matter is widely discussed by mass media, and we may draw some overall conclusions based on open publications in Russia and abroad.

Russia's SRF operate land-based ICBMs installed in underground silos and on mobile ground missile systems (MGMS), the amount of which is a bit larger. Both solutions are different types of response to the issue related to maximum survivability in nuclear strike conditions and, therefore, to ensure the counterstrike as an inevitable threat the doctrine of nuclear deterrence is based on. A modern underground silo features the highest level of protection. Taking into account the fact that silos are arranged in different locations, at a certain distance from each other, the enemy will have to spend at least one warhead to strike each silo or a few warheads to guarantee target killing (due to a possible failure of an attacking ICBM or a significant miss-distance). A launching silo is easy and inexpensive for operation. The disadvantage is that the enemy is likely to know coordinates of all underground silos, that is why their positions are potentially vulnerable to high-precision non-nuclear weapons. However, this issue may become urgent in a relatively distant future because today's strategic cruise missiles operate at a subsonic speed, so it would be practically impossible to strike silos all at once.

On the contrary, MGMSs are basically intended not for resistance to nuclear attacks in stationary conditions, but for mobility; since they are scattered during a threatening period, they become survivable to surgical strikes while effective countermeasures against such systems must include massive strikes in deployment areas, preferably, with large-yield munitions. Mobile platform's resistance to nuclear weapons effects is considerably below silo's resistance, but even under such circumstances the enemy will have to spend a large number of munitions to guarantee target killing.

The worst case scenario has been discussed above – the best solution here is not a counterstrike, but a launch under attack when an attacked country manages to launch its missiles before enemy's warheads strike deployment areas. The launch-under-attack concept involves nuclear attack warning systems, SNF control system and their operational effectiveness' and merits' separate and detailed consideration.

From 1987 to 2005 Russia had a small number of the Molodets railroad ICBM systems for limited use (12 missile trains carrying three launchers per train were produced) – the only railroad ICBM sys-

tems that reached the series production stage and combat alert status. From the tactical point of view, the railroad ICBM system is a specific modification of the MGMS system. The main difference is the application of a railroad system during a threatening period for dispersion of a long-distance railroad network. On the one hand, this allows to ensure high mobility; on the other hand, the application of civil infrastructure complicates safety assurance, and, to a certain degree, makes large transportation hubs (i.e. cities) vulnerable to the first strike. Another pressing issue associated with a missile train is if it's once located by enemy's reconnaissance systems, it would be difficult for a train to hide again for obvious reasons.

A new Barguzin railroad ICBM system has reached the design stage. It is designed to use more compact missiles that allow to reduce the system weight, and therefore, to improve its operational security. Unlike the Molodets system, this system will not require three diesel locomotives at once. However, the future of the Barguzin project is unclear because it is criticized by its customer and other experts for difficulties in operation and heavy expenses, especially in budget cut conditions, along with its questionable advantages in comparison to widely used wheel-mounted MGMSs.

Wheel-mounted MGMSs, namely the Topol ICBM family, including the RS-12M Topol, RS-12M2 Topol-M and RS-24 Yars, form the basis of SRF. The basic versions of the Topol system have been put on combat alert since 1985 and now they are withdrawn from operational status. This process is to be completed at the beginning of the next decade. The Topol missiles are regularly launched in order to confirm readiness and functionality of the fleet and test new solutions (taking into account that these systems are to be discarded, anyway; they are considered a "flying test lab" available for free). According to various estimations, 54-72 MGMSs of this type will remain operational, taking into account a non-stop process to convert the Topol systems into "non-deployed" systems and further disposal, it would be difficult to determine the exact amount of such system for the time being.

The RS-12M2 Topol-M systems (first deployment in 2006) and RS-24 Yars systems (first deployment in 2010) are advanced modifications of the Topol system with an improved missile. Due to an increase in the system weight, the number of axes has increased from 7 to 8. The Topol-M and Yars systems are similar in many aspects, but the most important difference is their armament. In comparison to the Topol-M system, which like the basic Topol version is equipped with a single 550 kt warhead, the Yars system is equipped with the MIRV with three or four 150-300 kt warheads (according to various estimations). Using a single warhead for the Topol-M system is associated with the design specifications in accordance with the START II requirements that prohibited to develop missile system with MIRV. After termination of the START II Treaty, the system was rapidly upgraded due to its initial technological potential.

Only 18 Topol-M MGMS units were deployed before transition to the Yars systems. However, its missile (60 missiles have been supplied) has been used since 1998 in order to replace the UR-100N UTTKh (RS-18A) ICBM with expired service life in underground silos. At least 63 mobile Yars systems have been deployed. In addition, these systems (no less than 10) are used for further replacement of the UR-100N systems in underground silos.

The RS-26 Rubezh MGMS project with a small-sized missile and a six-axis chassis is under development. Smaller overall dimensions will allow to drastically improve the maneuvering capability of the system, because the Yars systems are too heavy for general roads. It is announced that the Rubezh system is ready for deployment, but its deployment is likely to be suspended due political factors as the USA believes that this system may be employed to hit targets within a range that is significantly lower than 5,500 km and this capability violates the treaty on the elimination of intermediate-range and shorter-range missiles (INF Treaty).

In addition to the Topol-M and Yars systems, SRF has also silo-based ICBM systems. The UR-100N UTTKh missile systems put on combat alert in 1979 have almost been withdrawn from operational status – no more than 20-30 units remain operational, and the process of withdrawal will be completed in a couple of years. The long-liver is the R-36M2 Voevoda system (RS-20V mostly known by the NATO reporting name – SS-18 Satan) that is the world's largest ICBM carrying a 8.3 Mt warhead or 10 lightweight 800 kt warheads, plus a powerful antimissile defence penetration system. The R-36M2 missiles were put on combat alert in 1998. For now, 46 missiles of this type remain operational. At the beginning of the next decade they should be replaced with advanced heavy RS-28 Sarmat systems that are capable of carrying no less than 8 warheads, including advanced maneuvering warheads.

In Russia, SRF are the most important part of SNF. For equipping, the top priority is given to MGMSs with high survivability, but silo-based systems remain operational as a low cost option and as a platform for deploying large-yield missiles. In comparison to the Russian Navy, SRF operate not only a larger number of delivery vehicles, but also a larger number of carried warheads. SRF are successfully supplied with new military equipment, and as far as one can estimate, this equipment is successfully mastered during multiple military exercises.

Sarmat

VLADIMIR DEGTYAR, GENERAL DIRECTOR OF THE MAKEEV STATE MISSILE CENTER

"The prospective strategic missile system Sarmat is being developed for the purposes of guaranteed and efficient accomplishment of nuclear deterrence by the Russian strategic forces"

UGLY DUCKLINGS

In the USA, the land component is the weakest one in comparison to Russia. It is also indicated by the fact that land silo-based ICBMs are included in the Air Force structure – the Air Force Global Strike Command operates the so-called 20th Air Force that includes Missile Squadrons, part of Missile Wings.

The US Army operates LGM-30G Minuteman III system, the only type of ICBM available. The first Minuteman III systems were put on combat alert as far back as 1970 and at that time became a breakthrough solution due to the first application of MIRV. Of course, since then a large number of modernization programs were implemented, basically intended to enhance operational reliability and safety.

Category of Data	Deployed ICBMs, Deployed SLBMs, and Deployed Heavy Bombers		Deployed and Non-deployed Launchers of ICBMs, Deployed and Non-deployed Launchers of SLBMs, and Deployed and Non-deployed Heavy Bombers		Warheads on Deployed ICBMs, on Deployed SLBMs, and Nuclear Warheads Counted for Deployed Heavy Bombers	
	USA	RUSSIA	USA	RUSSIA	USA	RUSSIA
05.02.2011	882	521	1124	865	1800	1537
01.09.2011	822	516	1043	871	1790	1566
01.03.2012	812	494	1040	881	1737	1492
01.09.2012	806	491	1034	884	1722	1499
01.03.2013	792	492	1028	900	1654	1480
01.09.2013	809	473	1015	894	1688	1400
01.03.2014	778	498	952	905	1585	1512
01.09.2014	794	528	912	911	1642	1643
01.03.2015	785	515	898	890	1597	1582
01.09.2015	762	526	898	877	1538	1648
01.03.2016	741	521	878	856	1481	1735
01.09.2016	681	508	848	847	1367	1796
THE MAXIMUM ALLOWABLE LEVEL, WHICH SHOULD COME OUT IN 2018	700		800		1550	

One of the most crucial modifications left the Minuteman III system without MIRV – instead of three 350 kt warheads only a single 300 kt warhead was installed. Officially, with this modification the USA demonstrated the defensive behavior of their nuclear weapons concept, because MIRVs were primarily useful for the first strike scenario, when a single nuclear delivery vehicle was able to destroy a few enemy's delivery vehicles. However, the true reason for such a modification was likely to optimize the distribution pool available under the START III Treaty – without such measures the USA would have to cut down the most important programs related to SSBN and Trident II missiles.

"New" warheads were removed from the LGM-118 Peacekeeper systems that were newly developed and more advanced ICBMs (first deployment in 1986). Each Peacekeeper system was able to deliver 10 warheads instead of three, with higher precision and longer range. This missile was justly classified as the equivalent to the Soviet Union's Satan missile. But certain difficulties during development and the end of the Cold War resulted in production of quite a small batch of the Peacekeeper missiles – only 50 missiles were put on combat alert. The U.S. development programs related to MGMSs and railroad ICBM systems were not implemented for the same reasons. In late 1980s, under the influence of some developments in the Soviet Union, the project of a railroad ICBM system with the Peacekeeper missiles and the MGMS project with the new-small-sized MGM-134 Midgetman missile reached the active development phase. Both programs were closed in 1991-92 at the prototype testing phase. The Peacekeeper missiles were withdrawn from operational status in 2005, within the scope of measures under the START II Treaty.

The USA plans to keep 400 Minuteman III missiles operational by 2018. To accomplish this objective, 50 missiles will be put in "non-deployed" conditions, i.e. missiles will be put into storage while underground silos are to be buried. Thus, land-based ICBMs make a significant part (over 50%) in the pool of delivery vehicles while nobody plans to increase the number of SSBN and bomber aircraft. However, the number of warheads for the naval component is 2 to 3 times higher.

In the USA, the main objective of the land component in new conditions is to "pose threat", because for effective damage of underground silos, the enemy will have to spend a number of munitions that are larger than the total amount of munitions stored in silos. With this approach, requirements for missiles are not severe – the matter is that the enemy should believe that missiles are capable of liftoff. For the Minuteman III missiles, however, even liftoff may become a challenge sooner or later. These missiles are to be replaced under the Ground-Based Strategic Deterrent (GBSD) program. The capability to develop a MGMS or a railroad ICBM system has been analyzed, but a silo-based missile system has eventually been chosen as the cheapest and simplest solution. The GBSD program has reached an intense financing phase in 2016. The estimated cost of the 30-year program for development, production, and modernization of the ground infrastructure totals $62.3 billion. It is planned that the first missile squadron under the GBSD program will be put on combat alert in 2029. The Minuteman III missiles will be completely replaced by 2036, but delays are incident to most defence programs.

Though, the GBSD program is unlikely to be completed in full, because the US land component will be the first to be cut down if any further agreements to reduce nuclear weapons are concluded. And now, with a relatively comfortable format of the START III Treaty, there are some proposals to reduce the segment of the land component or even to fully replace it with more resistant SSBN and multirole bomber aircraft. ◆

GENESIS OF RUSSIAN HIGH-PRECISION RIFLES

At least a dozen of specimens of high-precision rifles are produced in Russia today. It is hard to believe that only 20 years ago our industry did not produce sniper's weapons whatsoever as it is understood, let's say, in the West.

Text
by **Vladislav Grinkevich**

The high-precision rifles have not been produced in the USSR for the defense and law enforcement agencies. In the West this class includes the rifles capable of driving five bullets into a circle of 1 inch in diameter from a distance of 100 meters, i.e. less than one minute of angle (1 MoA), from a distance of 100 m it corresponds to a circle of 2.9 cm in diameter. The Soviet Union did not need such weapons as, strictly speaking, there were no snipers in the Soviet Army of the second half of the 20th century. The military doctrine of that period anticipated the large-scale military operations, even with the use of mass destruction weapons. The single shooters hunting for individual enemy's soldiers and officers seemed to be anachronism (though, they have proven to be efficient during the World War II).

"COLD WAR" SNIPERS

Indeed, since early 1960s the rifle squads were manned with snipers, but the task of these combatants was to enhance the efficiency of unit's fire up to the distances of 400–700 meters, i.e. approximately twice as much as compared with AKM. In the Western armies such shooters are referred to as marksmen. In our country sometimes they are called "platoon riflemen".

The Dragunov sniper's rifle (SVD) went into service in 1963 and, being the only domestic sniper's rifle for more than 30 years, it became the weapon for the Soviet marksmen snipers. The SVD has demonstrated no accuracy wonders; according to standard four shot holes shall be fitted into a circle of 8 cm in diameter. It is nearly three times worse than the indicators of up-to-date prototypes. Never-

VSS "Vintorez"

An idea of silent sniper's weapons appeared with the Soviet army men in 1970s, but due to conflicting objectives its development stalled for nearly ten years. In 1987 a silent semi-automatic sniper's rifle VSS "Vintorez" for subsonic cartridge of 9x39 mm was built for Special Forces. "Vintorez" is not the sniper's rifle in every sense of the word; this is a close assault weapon. The pronounced effective range is 400 meters, normally, the rifle is used at distances up to 200 meters.

theless, a good deal of military experts considers the SVD to be a unique development, which unfixed the notions on capabilities of a "trench rifle".

Designer Eugeny Dragunov has succeeded to build a robust, very dependable and, at the same time, very precise weapon. Quite a task has been solved in the process of its development, i.e. provision of reliable operation of automatics using at the same time the old rifle cartridge of 7.62x54 mm with a rimmed cartridge case.

With respect to reliability the SVD notably surpasses competitors represented by sniper's variants of Belgian FN FAL, German G3 or American M14.

The Dragunov rifle is in the inventory of more than thirty countries and, like Kalashnikov submachine gun, has been used practically in all military conflicts of the modern age. According to some mass media, the Iraqi gunmen used to down light reconnaissance UAVs of the USA by means of SVD, while during the Civil war of 1979–1992 in Salvador someone shot down the jet attack plane with Dragunov rifle.

Apart from classical SVD, SVDS with folding stock has been produced, a short sniper's rifle (SVU) of bull-pup configuration. The latter was built in 1970s for paratroopers, but it did not happen to be produced in series. It was recollected again as late as the 1990s, when the Ministry of Internal Affairs wanted to put the SVU in service and requested the designers to introduce additionally the mode of automatic shooting (which has been implemented in models SVU-A and SVU-AS). Though, these prototypes did not come into widespread acceptance. As it often happens with the weapons of classic arrangement recomposed into a bull-pup, SVU has appeared to be non-ergonomic and unhandy. The rifle, for instance, is hard if not impossible for shooting from the left shoulder.

In 2006, the large-caliber version of Dragunov rifle SVDK for cartridge of 9.3x64 mm was put in service.

In the latest SVD model – SVDM (developed by Concern Kalashnikov) a thick forged barrel with long service life is installed, a breech frame is closed with rigidly fixed flap cover with Picatinny rail for setting wider range of sighting equipment.

FROM STADIUMS TO MILITARY FORCES

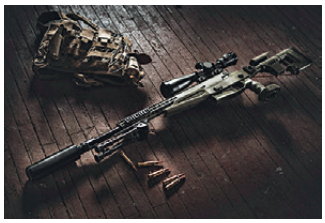
In 1990s after disintegration of the USSR the new challenges (local conflicts, terrorist threats) compelled the Special Forces to revise the attitude to the high-precision weapons. It appeared that the full-featured "sniper's barrels" are needed by everyone: army, militia, Federal Security Service, etc.

The Russian gunmakers went along nearly the same path as their Western colleagues did, i.e. they militarized the existing sport rifles featuring caliber of 7.62x54 mm.

Dragunov sniper's rifle (SVD)

The sniper's rifles of the US Army M24, and police rifle of Model 700P are based on popular Remington 700. In Russia, the first full-featured sniper's rifles have been designed on the basis of sport rifle from Tula MTs-116, which has been successfully used at international competitions in shooting at 100 and 300 meters, and "Record-CISM" rifle from Izhevsk. It has been built specifically for exercises according to the program of International Sport Shooting Federation (ISSF) and for competition in high-rate shooting according to the program of International Military Sports Council (CISM).

VSV-338



Concern Kalashnikov presented two promising sniper's rifles at the exhibition "Army – 2016" in September 2016 that were developed in an exploratory order. These are the compact semi-automatic SVK (Kalashnikov sniper's rifle) and the long-range VSV-338 sniper's rifle for cartridge of .338 Lapua Magnum. The SVK has been made with two calibers: for domestic cartridge of 7.62x54R and for NATO's 7.62x51. It is furnished with magazine cases for 10, 15 and 20 cartridges. The rifle can be used as an assault weapon with 20-cartridge magazines. The traces of Belgian FN SCAR, Italian Beretta ARX-160 or American Bushmaster ACR are tracked in SK design.

The long-range VSV-338 features a modular design (all rifle's units are assembled on the carrying body of aluminum alloy), which helps perform quick barrel replacement. According to the manufacturer's statement, the rifle is intended to be used by snipers under any weather conditions, when shooting from a distance up to 1,500 meters.

SVK
(Kalashnikov sniper's rifle)

SV-98

In 1997, the Central Design and Research Bureau for Sporting and Hunting Weapons in Tula presented the sniper's rifle MTs-116M, and a year later Izhmash (now Concern Kalashnikov) demonstrated its SV-98. According to statements of military experts, some prototypes of this rifle were able to pump a group of four shots almost bullet to bullet in case of firing with serial combat sniper's munitions.

In general, characteristics of SV-98 and MTs-116M are similar: cartridge 7.62x54 mm, manual reloading, detachable magazines, a stock with adjustable butt plate and cheek piece. The declared range of firing ranges up to 800 meters for MTs-116M and up to 1,000 meters for SV-98.

Besides, both rifles feature archaic elements: butt and stock for MTs-116M are made of wood, for SV-98 it is made of plywood. By the way, it was declared at Concern Kalashnikov that the plywood butt was replaced with aluminum one in 2016.

Some prototypes of this rifle were able to pump a group of four shots almost bullet to bullet in case of firing with serial combat sniper's munitions

MTs-116M

FROWNS FROM 1990S

But sometimes rather awkward things have been made by the designers, like OTs-48K rifle. In the 1990s the Central Design and Research Bureau for Sporting and Hunting Weapons was given a task to design a low-end variant of sniper's rifle for the Ministry of Internal Affairs. In order to make a cheap "sniper's barrel", Tula's designers took old Mosin rifles of 1891/30 from the stores (certainly, the best barrels have been selected), and placed them into a new butt in a bull-pup arrangement. They added a rubber butt plate and cheek piece, modernized a firing trigger, and an additional lever has been installed for loading convenience connecting it by means of special metal tie-rod with the main one ("original" breech mechanism lever went somewhere under the shooter's cheek). This has even more complicated the breech mechanism manipulations. A compact, 85 cm only, most probably, cheap, but extremely inconvenient weapon came to hand.

One more strange creation of the 1990s was the small-caliber sniper's rifle SV-99 for cartridge .22 LR (the so called "twenty-two") with biathlon-type breech mechanism. It has been designed in Izhevsk on the base of sport rifle "Biathlon-7-2" for the Ministry of Internal Affairs.

The rifle was supposed to be used in public places, e.g., for providing security in airports. A small lead bullet with small initial speed practically excluded ricochet burst, which means that the risk of occasional victims decreased during firing. Indeed, SV-99 was not able to destroy an enemy reliably and quickly due to its low power.

According to available data, this weapon is used for destroying CCTV cameras, as well as for shooting off stray dogs (though in this case the rifle's efficiency is also doubtful).

COMPETITORS OF THE STATE

Private companies have entered the market of high-precision weapons in the mid-2000s. Vladislav Lobaev, known shooter and designer who founded 'Tsar Cannon' Company, was a pioneer in this field. In 2010 the company stopped working in Russia and moved to the UAE in a body. Lobaev himself names the conflict with functionaries, who have declined to extend license, as a reason for it.

In 2013 Lobaev resumed production in Russia by establishing Corporation LOBAEV with the department "Design Bureau of Integrated Systems" (DBIS), which is specialized in the production of long-range and super long-range rifles.

For the moment, apart from DBIS (LOBAEV Arms brand) three private players are involved in the segment of high-precision weapons: Promtekhnologiya (Orsis brand), SKAT, and Moscow Weapons Company. Yet, only Promtekhnologiya has mastered serial manufacture of produce, DBIS is technically ready to do it (the company extends its production facilities now). SKAT and Moscow Weapons Company work in the format of weapons workshops providing one-off products for certain customers.

The range of Orsis products includes five high-precision rifles of in-house development. The company's landmark is the T-5000 rifle, which was introduced in 2011 and positioned as a universal high-precision weapon for hunting, sport and defense and law enforcement agencies.

T-5000 has been made in the aggressive tactical design and is produced with five calibers: from .260Rem to .338 Lapua Magnum. The basic are the following: .308 Win (7.62x51 mm) and powerful .338 Lapua Magnum (8.6x70 mm), the effective range reaches one and a half kilometers in this caliber.

T-5000 surpasses the Austrian SSG 08 of Steyr-Mannlicher, which has been supplied for the snipers of the Russian Military Intelligence

DXL-3 Longstrike in 338 Lapua

T-5000

The new rifle has been initially announced as a competitor to the leading overseas brands, in particular, it was reported that T-5000 surpasses the Austrian SSG 08 of Steyr-Mannlicher, which has been supplied for the snipers of the Russian Military Intelligence.

According to statements of experts and comments of some users, the design, ergonomics and accuracy of T-5000 (0.5 MoA or about 1.5 cm per 100 meters) actually meets the most stringent requirements. One can recollect that in June 2012 the team from "Alpha" group of the Federal Security Service with rifles T-5000 won at the International competitions of police and army snipers. In May 2016, the pair of snipers (shooter and corrector) of Security Service of the President of the Federal Security Guard Service of the Russian Federation won with Orsis rifles at the Championship of Europe in sniping in Czech Republic.

METAMORPHOSES OF T-5000

Orsis has never concealed its intention to become the supplier for the Russian defense and law enforcement agencies. As far back as September 2012, T-5000 was tested as a part of the set of "Ratnik" outfit. But the matter failed to advance further. Even though for today there is an experience "regarding mass use" of this rifle abroad, nevertheless, T-5000 is not included into inventory of any single national defense and law enforcement agency.

There are several reasons for it. Let us start from the fact that our special forces prefer to deal with state companies, but not private ones. Besides, not just a rifle will be put in service but the sniper's complex of the weapon, sighting equipment, and munitions, and all that should be produced by Russian enterprises. Only a state structure having vast experience of dealing with military bureaucracy will be able to coordinate activities in all directions, to fit performance characteristics to the needs of Special Forces and draw up documentation correctly, which may be of immense complexity.

Probably, this is the reason why the Central Scientific and Research Institute for Precision Machinery Engineering from Klimovsk located near Moscow received an order for the development of complex for the army and the Federal Security Guard Service on the basis of T-5000. At the end of 2013, the beginning of works on the complex "Precision" ("Tochnost", caliber 8.6x70) was announced. Actually, the Institute from Klimovsk came forward as an aggregator, who coordinated works of Orsis, of Dedal NV – manufacturer of sighting equipment, and of cartridge-producing plants. Apart from this, about 200 changes have been introduced into baseline design of T-5000 in the course of work, according to the enterprise press service statement.

Dmitry Semizorov, the Head of TsNII-TochMash, declared in November 2016 that the weapon has passed the state testing procedure and is ready to be produced in series. The rifle has been made in two versions: for the Ministry of Defense and for the Federal Security Guard Service. The preliminary testing of "Precision" for the military are to take place in 2017.

THE SECOND ATTEMPT

One of the specific features of "Precision" project consists in the fact that initially it was non-competitive. Though, more than likely, potential contestants could be found.

The mentioned DBIS developed as many as seven models of high-precision rifles in 2014–2015, basically, for big calibers: 300 Win Mag (7.62x67), 338 Lapua Magnum and even 408 Cheyenne Tactical (10.3x77) – a special sniper's munitions developed for shooting at 3,500 meters. The stated specifications of Lobaev's rifles are very high: accuracy from 0.3 to 0.5 MoA. The weapon is made in a very aggressive tactical design and features no less aggressive names: "Sumrak" (Dusk), "Vozmezdiye" (Retaliation), "Stalingrad", "Diversant" (Subversive), "Skalpel" (Lancet).

Vladislav Lobaev regards as his pride the super long-range rifle SVLK-14 "Sumrak" with caliber of 408 Cheyenne Tactical. In 2015 the record-winning long-distance shot was made from a cus-

SVLK-14 Twilight in 408 Cheyta

In 2015 the record-winning long-distance shot was made from a customized variant of SVLK-14 at 3,400 meters

VSK "Vykhlop" (the same VSSK/6S8)

tomized variant of SVLK-14 at 3,400 meters (a board measuring 1 m to 1 m was used as a shooting mark).

The rifles of LOBAEV Arms have been certified as non-military weapons, but the designer reckons to quicken the interest in its produce, both from the Russian Special Forces and their foreign colleagues. According to the company's information, the rifles of LOBAEV Arms are used today by the President's Security Service and Federal Enforcement Service units.

"ANTIMATERIAL" RIFLES

An independent direction in the sniper's weapons is associated with the heavy rifles featuring caliber more than 9 mm (basically, 12.7 mm), these are a kind of reincarnation of anti-tank rifles of the World War II. Such rifles in the USA are referred to as "antimaterial" rifles – not because they can annihilate matter, but because they are intended for hitting "tough" targets: firing positions (a magnum can make a hole in the wall, which hides a sniper or a machine gunner), jeeps, light armoured vehicles, etc.

In 1983, Pentagon purchased a batch of M500 rifles of 12.7 mm caliber from Research Armaments Prototypes company (RAP), they have been used in Lebanon, Panama, Haiti, and Iraq. It has been reported that proceeding from the results of the "Desert Storm" operation the Americans even begun to establish special groups of snipers for killing rocket launchers.

The first large-caliber semi-automatic OSV-96 sniper's rifle for cartridge of 12.7x108 mm appeared in our country from Instrument Design Bureau (Tula) in the mid-1990s. In 2000, Kovrov Degtyarev Plant (ZiD) made its bull-pup variant KSVK. In 2004 the Kovrovites presented their improved version named ASVK (large-caliber combat sniper's rifle).

It is declared in performance specifications that the rifle of caliber 12.7 mm is capable of precision shooting at a distance of 1.5 km and more when using special sniper's cartridges. An average covering circle declared by the manufacturer makes about 160 mm at the distance of 300 m (without using special munitions).

According to open sources, the bullets get settled into a rectangular of 3x6 meters in case of shooting with armour-piercing machine-gun cartridges of 12.7 mm from a distance of 1,500 yards (about 1,300 meters). It allows at its best to hit a vehicle or an armoured personnel carrier, but definitely not an individual.

A special direction in this segment belongs to the rifles of low-noise shooting. The large-caliber rifle, and to be more exact, the sniper's complex VSK "Vykhlop" (the same VSSK/6S8) has been created according to a special order of the Special Operations Center (SOC) of the Federal Security Service of Russia. The rifle of caliber 12.7x55 mm is intended for silent hitting of protected targets: vehicles, non-armoured equipment, and soldiers in heavy body armour vests.

The complex VSK "Vykhlop" was demonstrated for the first time at the exhibition Interpolitex in Moscow in the fall of 2005. The weapon has been produced in small quantities and is included into inventory of the units of the Special Operations Center of the Federal Security Service of Russia. ◆

Organizer:

MINISTRY OF DEFENCE
OF THE RUSSIAN FEDERATION

August
22-27

ARMY 2017

INTERNATIONAL MILITARY-TECHNICAL FORUM "ARMY-2017"

Location

PATRIOT EXPO

Exhibition operator

MKB

www.rusarmyexpo.com

I Understand What Weapons Will Be Used in Five to Ten Years

VLADISLAV LOBAEV IS THE FOUNDER OF THE FIRST RUSSIAN PRIVATE ARMS COMPANY AND ONE OF THE BEST-KNOWN MANUFACTURERS OF HIGH-PRECISION LONG-RANGE RIFLES. TODAY THE COMPANY DIVERSIFIES ITS BUSINESS AND MASTERS ABSOLUTELY NEW LINES OF ACTIVITY.


Light tactical robot Minirex

The company's history began in 2005, when Vladislav Lobaev with a couple of his like-minded fellows established a production facility, more truly, a workshop for manufacturing high precision rifles. In order to collect enough money for the initial capital, the founder of the Tsar Cannon (that was the name of the firm) had even to sell his own apartment.

At the beginning the company has assembled weapons of the imported component parts, but approximately by 2007 it had mastered a complete production cycle. In 2010, the Tsar Cannon closed a license agreement with TAWAZUN Concern of the United Arab Emirates. In three years Lobaev has founded LOBAEV Corporation in Russia (brand of LOBAEV Arms).

Nowadays the range of company's products includes seven high-precision rifles of different calibers. Some of them are capable of hitting targets at the distance exceeding two thousand meters, while an alleged accuracy of Lobaev's rifles equals less than half a minute of angle (MOA).

The arms workshop itself has turned into a multiproduct Holding Company.

Vladislav, what are the processes that are going on inside the company We know that you expand the production facilities, do you work on new lines of activity?

We build the Holding of three companies, including Design Bureau of Integrated Systems (DBIS) that is the main development agency of small-arms systems, Trading company LOBAEV Arms and a subdivision LOBAEV Robotics dealing with designing and manufacturing of robotic systems and projects relating to electronics.

It is a large project, however it has never been thought of like that. Presently the recent trends are being in progress, maybe, they will become the basic ones. Of course, rifles will be dealt with, bu there exist more interesting goals that engross the lion's share of time.

What are these projects, what is the readiness phase thereof?

To begin with, let me tell you that in 2017 we will completely renew the existing model range of the rifles, we are making ready for production a brand new rifle unique for the market – a high-precision long-range semi-automatic rifle of .338 LM (Lapua Magnum) and .408 CheyTac calibers, we are setting up production of two new hunting models.

DBIS develops the hypersonic munitions, smart dual-channel sighting device (with day-time TV channel and thermal-imaging channel).

We are getting ready to launch quantity production of an automated complex of perimeter security, it will be provided in lethal and non-lethal versions. I will not disclose its performance characteristics. We develop also the light high-mobility tactical robots Minirex; this is a joint development of DBIS and LOBAEV Robotics.

Let us begin from traditional produce. You referred to your self-loading rifle as a unique one. What will be the difference between these rifles and, let's say, Barrett rifles?

First of all, the difference consists in fire precision and range. The self-loading Barrett rifles of identical caliber feature accuracy of about 2 MOA and steadily hit a target at the distances of up to 1,600 meters, maximum – up to 1,800 meters. We have succeeded to gain accuracy up to 0.5 MOA for .408 cartridges, and provide for reliable target hitting at the distances of two kilometers. Believe me, that it is very far from simple to make a half-MOA self-loading rifle with the range of 2.000 m.

We have developed a similar rifle in the UAE, and we managed to attain the desired accuracy, but the problems with weapons reliability remained. Now we were able to solve them proceeding from the experience and new knowledge.

Technically this is a gas-vented semi-automatic weapon with rotation bolt locking. The magazine cases for five cartridges of .408 caliber and for 10 cartridges of .338 caliber. We had made the magazine cases ourselves, and they appeared to be very reliable.

Supposedly, we will present a new product in March. It does not even have any commercial name so far.

What about hunting rifles?

These are the long-standing pilot projects too. Two rifles featuring manual reloading and straight pull bolt, like Blaser's, but with different locking principle. One of them has been made with aluminum tactical stock, it weighs 2.5 kilograms only. The second one has been made purely in hunting design.


TSVL-8 "Stalingrad" in 338 Lapua

You have mentioned the hypersonic munitions, are they the pilot projects too? And the term "hypersonic", what does it stand for?

They are absolutely new. The hypersound implies speed from Mach 5, i.e. exceeding 1,500 meters per second. We are developing munitions with the initial speed exceeding 2,000 meters per second. It will provide just crazy flatness and armor-piercing effect, for instance, this will make it possible to shoot to one thousand meters making no corrections.

Definitely, the service life of barrels will become somewhat lower when using these cartridges, but taking into account the tasks to be solved, the economic effect will be higher.

What about a smart sighting device you talked about, is it a domestic analog of American Tracking Point or something simpler?

In terms of functions it is the analog of Tracking Point, it is also provided with ballistic computer connected via Bluetooth with weather station at the weapon or with scattered sensors. It is also provided with automatic or manual target lock-on, a mode of target tracking. A computer with Linux operation system analyzes the input data (distance, speed of target motion, weather conditions, etc.) and automatically chooses the time for shooting. The sighting device components are distributed in the stock of the new rifle, which looks fairly in a "Star Wars" manner; we had to specifically develop a new weapon.

A difference from the analogs consists in a two-channel design; the other sighting devices are provided either with thermal-imaging channel, or with TV channel, we have both. And the other difference is the range; the competitors provide 800 meters, shooting at distances exceeding two kilometers, i.e. it will fit the long-range firing capability of our existing models.

What is the meaning of "scattered sensors"?

A shooter is exposed to wind, and the near-target northing is also exposed to wind. One can use additional wind gauges with wireless communication channel. For example, a drone disperses several sensors and you can control the entire battlefield.

A functional mock-up will be ready at the end of January. It will take two to three months more for the production prototype to appear.

I see, it is just one of the lines of activity, where the Holding Company is involved. What else do you do? It would be interesting to hear about a complex of perimeter security.

In accordance with corporate policy we can not disclose any details and performance characteristics, until an article is ready for sale in the storage in the amount of 20–50 units.

SVLK-14 Twilight in 408 Cheytac

It is a robotized complex for safeguarding various objects, including Federal Penitentiary Service of Russia, government and commercial buildings. It is controlled by one person. Depending on the purpose the sniper robots can use either lethal or non-lethal munitions, and, it is possible to changeover quite quickly from one type of munitions to another. The arms platform is equipped with a drum comprising magazine cases of different types, which interchange internally. This is all, so far.

Highlight of the show is robot Minirex. Please, give us more details about it.

It is a mobile tactical complex developed specifically for city battles and anti-terrorist operations. It features good all-terrain capability, it is able to climb the stairs, use hides, fire from window openings. Wherever it falls, it will manage to rise from any position.

The complex weighs 35 kilograms only, it can find room in a knapsack, and can be carried by a crew of two persons: an operator and a shooter. A special shooting device with 7.62x39 mm caliber and efficient shooting range on the head figure of up to 400 meters will be used as the weapon. There exist options for a cartridge of 9x39 mm, .338 LW and .408 LW.

Minirex is provided with two sighting channels: a day-time TV channel and a thermal-imaging channel converged into a single image. It features the built-in ballistic computer, capability of automatic or manual target lock-on. Minirex is provided with target memory. Let's say, it locks on the target, turns away, and as soon as it turns back again, it will recollect the target and focus on it. Add our firm-special accuracy to it.

Now we are developing a heavier robotized anti-sniper complex with the shooting range exceeding two kilometers.

Having began from sniper rifles you switched over to smart sighting devices and robots. Why?

As I said before, we do not abandon rifles. But I understand what weapons will be used by everyone in five to ten years. And we are not going to jump into the last train, we would like to be the railway engine. The self-loading rifle, the hunting rifles are only changing of old things on a new round of knowledge. And these things become new: though the perimeter complex has also been at the stage of design for two years, only now it became possible to make it.

What was the obstacle?

Money. Actually, the absence of money. Nowadays, the investor has appeared, who is interested in it, we develop this trend together.

Our private arms companies are infrequently referred to as the workshops, what are the capabilities of your production facility?

Presently, 50 rifles a month are offered for sale, beginning from March we will increase supplies up to 100 pieces. This is quite an important series for the articles of such complexity level. The equipment (we use very expensive five-axis and ten-axis machine tools that cost half a million euro) makes it possible to manufacture 5,000 rifles a year. Though, the production is related to demand; it is not a sure bet that they will be sold as quickly as they are produced. ◆

"New T-90MS tank has been time and again demonstrated at international exhibitions, including the biggest regional IDEX exhibition in Abu-Dhabi. We are confident that T-90MS being the summit of development of T-72/T-90 family is the best tank offered in the international market of armaments today for its totality of parameters and "efficiency-cost" criterion"

SERGEI GORESLAVSKY,
DEPUTY DIRECTOR GENERAL OF ROSOBORONEXPORT

PRIMUS INTER PARES

For many years now Russia has held more than a half of the export market of new tanks. The main combat tank T-90S, which was approved by very many buyers and especially by Indians, became a recipe for success in this respect. In general, not less than 2,100 tanks of this modification have been supplied and contracted, 1,657 out of this number will be received by Delhi at its disposal.

Text
by **Leonid Nersisyan,**
military analyst

T-90S

How this mighty success of T-90S that has deprived the Western armoured equipment of competitive edge can be explained and does the Russian tank-building industry have further prospects in the world market of armaments?

WHAT IS THE KEY TO THE EXPORT SUCCESS OF T-90?

T-90S tank succeeded to push practically all Western armoured produce from the neutral markets (not associated with close allies of the USA). It can be explained by several reasons.

First of all, the cost of T-90 is very much attractive as compared with the Western tanks such as German Leopard 2A6/A7, American M1A2 Abrams, French Leclerc, etc. If Russian T-90S costs about $2.5 million, and the most up-to-date T-90MS costs approximately $4.5 million, the Western tank-building school offers machines costing from $6 million and more. Naturally, such a great difference in price is fundamental for many countries. Secondly, the arrangement of the Russian tanks featuring some lacks in terms of security of combat ammunition load provides the main advantage: the use of gun loading automatic device helps to reduce the crew from four persons (with the Western machines) to three. It reduces the personnel strength by 25%, which is also a serious cost cutout especially in professional armies based on contract principles, where the military personnel receives service pay.

The family of T-72 tanks, which includes T-90 in all its modifications, features a number of other advantages. They are the following: low tank weight as a result of using gun loading automatic device instead of "surplus" crew member: T-90 features weight of 46–48 tons depending on modification, when the Western machines weigh 60 tons and more. Taking into account installation of the engines featuring power of 1,000 (with T-90S) or 1,130 h.p. (with T-90MS), the Russian tank definitely wins its competitors with respect to mobility and terrain crossing capacity. One more great advantage is the ability to fire the anti-tank guided missiles (ATGM) "Reflex-M" from the main tank gun. A very small number of competitors feature such a capability having multi-fold higher cost. For instance, the Israeli tank Merkava Mk4 capable of launching ATGM LAHAT from a gun, costs about $10 million. No wonder that for now Merkava has been procured by Singapore only in the amount of 50 units.

Anti-tank guided missiles (ATGM) "Reflex-M"

"Series production of the newest T-14 tank has begun in Russia. Re-equipment of army with the newest prototypes of combat armament continues to be one of the main priorities of the Government of the country despite the sanctions, low oil prices, and defense budget reduction"

SERGEY CHEMEZOV,
CHIEF EXECUTIVE OFFICER OF CORPORATION ROSTEC

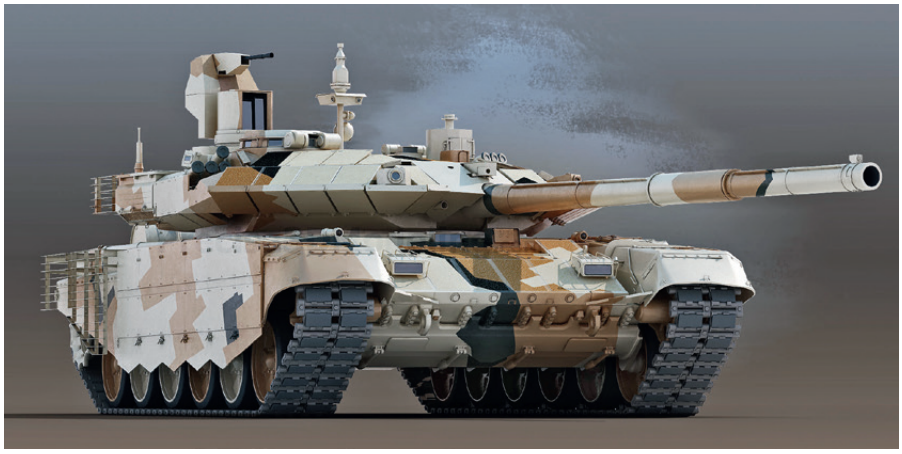
"PRORYV" COMES TO REPLACE THE "KING OF EXPORT" T-90S

In spite of its immense success, T-90S is often criticized by many experts. First of all, because of its insufficient protection as a result of obsolescent explosive-reactive armour "Contact-5" and arrangement of combat ammunition load in the tank fighting compartment together with the crew (a "penalty" for the use of automatic loading device, but not the fourth crew member) bringing about the guaranteed death of personnel in case of its detonation. The criticism concerns also a relatively "weak" fire control system (FCS) as well as low armour-piercing effect of the subcaliber kinetic energy projectiles used in T-90S. If the second factor arising as a result of using that same automatic loading device (it is not able to accommodate projectiles of greater length, this is exactly the way they have increased the power of rounds in the West) is partially solved by using ATGM "Reflex-M", the FCS had to be replaced with the more up-to-date one.

Taking into account the listed drawbacks, the latest version of T-90MS "Proryv" tank (T-90AM for the Russian troops) was developed. The up-to-date Russian explosive-reactive armour "Relict" was installed on the machine, which surpasses "Contact-5" significantly with respect to such parameters as overlap area (68% of tank frontal projection as compared with 40–45% of its predecessor) and protection against cumulative and, especially, subcaliber kinetic energy projectiles.

The problem with frequent detonation of combat ammunition load and presence of its greater part in the fighting compartment together with the tank crew has also not been left unnoticed. The tank has acquired a new automatic loading device, which carousel stowage became protected now with an armoured cover plate. The automatic loading device proper comprises, as before, 22 rounds (of any types and in arbitrary relation: subcaliber kinetic energy projectiles, high explosive fragmentation projectiles or ATGM). The 18 projectiles that have been arranged earlier together with the crew are distributed now in a different way: 10 rounds have been moved from the fighting

T-90MS



It could well be the case that the countries armed with T-90S tank will have an intention to upgrade this stock to T-90MS level

compartment into a special armoured cell in the tank turret rear, while the remaining 8 rounds have been distributed among the most protected locations inside the tank. This approach has allowed not only significantly enhance the crew protection, but provide more comfortable conditions for it: the fighting compartment became notably more spacious.

As for the limited length of the subcaliber kinetic energy projectiles, this disadvantage has also been partially solved by installation of a new automatic loading device. Now T-90 is capable of delivering fire by means of new rounds competitive with the Western ones with respect to characteristics. Besides, T-90MS is equipped with the cutting-edge Russian 125-mm tank gun 2A46M-5, which makes it possible to deliver fire with the accuracy exceeding the predecessors by 20%.

And the last "cherry on the cake" is the new FCS "Kalina" with integrated combat information and control system of a tactical link. The commander panoramic sight features two-plane independent sight line stabilization, a laser ranging device, a TV channel and an imaging infrared channel. The multichannel sighting device of operator-gunner "Sosna-U" features a two-plane independent sight line stabilization, a sighting channel, an imaging infrared channel, a laser ranging device and a laser channel to control the guided munitions system. "Kalina" helps to take over targets for automatic tracking, which essentially simplifies the crew's mission. This system helped the Russian T-90MS to become level with Western tanks as far as electronics is concerned.

No surprise that success came quickly. India has already approved a deal for procurement of 464 T-90MS tanks from Uralvagonzavod. It could well be the case that the countries armed with T-90S tank will have an intention to upgrade this stock to T-90MS level. Some countries from the Middle East, e.g. UAE, have also taken interest in the machine. Thus, T-90MS is capable of being demanded in the world market for at least 5–10 years.

American M1A2 Abrams, Israeli Merkava Mk4, French Leclerc, German Leopard 2A6/A7

T-14 "Armata"

GENERATIONAL CHANGE: T-14 "ARMATA" SHALL OCCUPY THE PLACE OF T-90 AFTER 2025

Despite the fact, that T-90 is still successful as far as export is concerned, this process cannot be endless. The armed forces of the majority of financially reliable states are already being saturated with the 3rd generation armoured equipment, which includes a family of T-72 tanks. Therefore, it is necessary to face the future. Russia still has very good prospects for the leadership in the market of new tanks for a long time: due to building an export version of the new-generation advanced T-14 tank on the heavy tracked vehicle platform "Armata".

T-14 is the first tank in the world provided with an unmanned turret. The crew is accommodated in an isolated armoured capsule, which guarantees its survival even in case of combat ammunition load detonation. The machine has acquired the up-to-date available offensive and defensive facilities. It stands to mention separately the installation of the active protection complex (APC) "Afganit" on the tank, which is the only system in the world capable of hitting in approach not only the rounds from anti-tank grenade launchers and anti-tank missile systems, but the subcaliber kinetic energy projectiles as well. The newest explosive-reactive armour "Malakhit" is going to save the tank from the munitions penetrating APC. The tank will for sure be successful in the market due to its modular design; it can be easily customized to requirements of any customer. It is interesting that despite its "frills" and a new layout for the world tank-building industry, T-14 is still cheaper than its overseas competitors, which makes it even more attractive.

At this stage, Uralvagonzavod produces the initial 100 tanks T-14 "Armata" for the Russian army. Simultaneously, the machine undergoes the operational service tests being at the final stage of "perfection". In total it is scheduled to procure 2,500 T-14 tanks for the Russian Armed Forces. And most probably they will begin to export the tanks after 2025, when the Russian Federation obtains a sufficient number of tanks in the inventory. Until that time T-90 will remain to be the "flagship" of the Russian tank export. ◆

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AZART R-187-P1E

Handheld Combat Radio

R-187-P1E is a multimode VHF/UHF handheld tactical team radio with software defined programmable security architecture (SDR) designed to enhance situational awareness and ensure continuous connection for individual warfighters, improving mission cohesiveness and effectiveness in a geographically, climate-challenged and combat environment.

HIGH INTERFERENCE IMMUNITY & NOISE RESISTANCE

The R-187-P1E radio has a two-channel wideband transceiver (27-520 MHz) and software based operating frequency setting. The device utilizes a robust 20 000 hops per sec frequency hopping and effectively adapts to a challenged electromagnetic environment.

WIDE RANGE OF FUNCTIONAL CAPABILITIES

The R-187-P1E radio supports different types of radio signals and communication protocols to transfer voice and data over long distances and at high speeds.

SECURE COMMUNICATIONS

The R-187-P1E radio has a design mirroring the device supplied to the Armed Forces of the Russian Federation, is highly immune to interference of modern and perspective electronic warfare technologies and provides highly noise resistant data coding.

ADAPTABILITY

Interoperability with different legacy radio systems provides seamless integration with the existing range of radio communication devices. Product life cycle is extended through regular firmware update, which makes the maintenance extremely cost-effective.

DURABLE & EASY-TO-USE

Interactive interface, full color 2.4'' LCD-display and keypad with easy-to-press buttons provide intuitive handling and usability. The high tech radio is contained within a compact and durable design and coated into a soft-touch cover which makes it perfectly adapted for one-hand-use.

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npo angstrem

azart R-187-P1E

TECHNICAL SPECIFICATIONS

GENERAL	
Nomenclature	R-187-P1E
Frequency Range	27-520 MHz
Channel Spacing/Bandwidth	• VHF: 1; 6.25; 8.33 kHz • UHF: 25 kHz
Communication Range	< 2.5 ml (< 4 km)

SECURITY	
FHSS Speed	≤ 20 000 hops per sec

TRANSMITTER	
Power Output	• VHF: 4 W • UHF 1 W
Harmonic Suppression	> 40 dBc
Spurious Suppression	> 50 dBc
Frequency Stability	1 ppm

RECEIVER	
Blocking Dynamic Range	> 86 dB
Sensitivity	< 0.5 μV
Adjacent Channel Rejection	> 55 dB
TETRA Intermodulation Selectivity	> –47 dBm

DATA TRANSFER RATE	
Encryption-free Mode	< 256 kbps
Frequency Hopping Mode	< 28.8 kbps
Masking Mode	< 7.2 kbps

POWER	
Battery Types	Li-Ion 6 A·h; Li-Ion 12 A·h, rechargeable
Battery Life	> 12 hours
Battery Life Cycle	500 charge cycles

ENVIRONMENTAL*	
Shock and Vibration	drop
Operating Temperature	–22...+131 °F (–30...+55°C)
Dust and Water Intrusion	IP65

* The R-187-P1E handheld radio is specifically designed for use in a geographically and climate challenged environment, e.g. northern, desert, mountain or forest areas.

SPECIFICATIONS	
Dimensions w/o antenna (H x W x D)	75.6 × 25.6 × 14.6 in (192 × 65 × 37 mm)
Product Color	at customer's request
Weight	<1.1 lbs (< 0.5 kg)
Display	2.4'' 16M, LCD 320 × 240 RGB (49 × 38.5 mm)
Keypad	27.2 × 18.1 in, alphanumeric (69 × 46 mm)

MODES AND WAVEFORMS	
Voice Operations	• simplex • half duplex • duplex (with TETRA base station)
Retransmission	time division based (UHF)
Main Functions & Features	• signal coding • file exchange • voice and data transfer in FHSS mode • time division data retransmission (digital mode) • voice masking • SDS messaging • programmable channels • menu selectable groups • scanning reception (16 preset channels) • standby reception (energy saving mode) • automated radio data entry via wireline and wireless channels
GPS/GLONASS	• built-in antenna/receiver • GPS position reporting and reception • coordination accuracy determination of no less than 25 m latitude and longitude and 40 m altitude (using the C/A code only)

ACCESSORIES**	
Antennas	• 27–520 MHz antenna — 1 pc • 100–520 MHz antenna — 1 pc • 136–520 MHz antenna — 1 pc
Remote Control	1 pc
Headset	1 pc
Batteries	2 pcs
Battery Charger	1 pc
Cable	1 pc
Software CD	1 pc
Technical Documentation	• technical passport — 1 pc • user manual — 1 pc • operator manual — 1 pc

** Items that are part of the standard R-187-P1E kit.

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Common Synthetic Battlefield – Next Generation Combat Training

THE DEVELOPMENT OF COMPUTER SIMULATION SOFTWARE AND VISUAL AIDS HAS BEEN MAKING A TANGIBLE PROGRESS RECENTLY, AUGMENTING CAPABILITIES AND ROLE OF SIMULATORS USED FOR OPERATIONAL, COMBAT AND INTEROPERABILITY TRAINING OF MILITARY UNITS. VIRTUAL TRAINING, BEING ACTIVELY INTRODUCED, NOT ONLY ALLOWS TO SAVE MILITARY SYSTEMS' SERVICE LIFE AND FUEL AND AMMUNITION COST, BUT ALSO ENHANCES QUALITY, EFFICIENCY, AND SAFETY OF MILITARY PERSONNEL TRAINING FOR ALL TYPES OF MODERN ARMED CONFLICTS, RANGING FROM LOCAL ANTI-TERRORIST OPERATIONS TO WIDE-SCALE WAR.

It must be added that high-level unit co-operation and rapid reaction to quick changes of tactical situation are most important factors contributing to combat success.

This is why the evolution of educational and training facilities has reached by now the stage of versatile integrated simulators providing joint training of specialists in various military services and branches. Russia is pioneering in this technology, with a top-of-the line product introduced by 'Kronstadt Group', a Saint Petersburg company with a long and successful history of innovative products and solutions for defence and national security. The product is the new-generation tactical simulator "Combat-E", based on integrated Common Synthetic Battlefield Environment (CSBE).

Kronstadt's tactical simulator offers unparalleled functionality and meticulously modeled real-life algorithms of tactical missions. The system can be employed for units training in various military branches and law enforcement agencies with due account of their service specifics and assigned missions.

One of the system's key features is its ability to visualize large-area landscapes composed of 3D topographic layers, automatically rendered from the reference 2D maps, which comprise various types of terrain, woodlands, roads, rivers, buildings etc. This technology allows the system to visualize any real-world geo-specific terrain taking into account its properties, as well as generate 3D layers based on existing digital maps.

Tactical situation is plotted on the map (and, at the same time, on the 3D layer) by means of standard conventional symbols that can be replaced/supplemented on customer request. One of major hard-to-solve problems for modern battlefield simulation systems is the generalization of tactical situation at different scales and data representation formats while preserving spatial parameters and logical ties. For such cases Russian specialists have developed an effective solution – the so-called "smart symbols" technology. It allows users to quickly plot and edit various tactical situation scenarios, control time and spatial parameters, automatically transfer any scenario to a virtual battlefield, and even change the initial tactical concept during a training session in the tactical simulator. Such flexibility of the "Combat-E" system opens huge opportunities for commanders and staff to perfect their tactical skills and enhance their interoperability.

The simulator allows practicing tactical training tasks and fire missions for teams within a unit according to standards set by respective regulatory documents. But more importantly, the "Combat-E" system can form the basis for tactical exercises conducted at the brigade-battalion-company level.

Truly efficient combat training within Synthetic Battlefield requires very realistically simulated Artificial Intelligence (AI) driven units. The technology implemented in the simulator allows modeling smart tactical actions of such computer generated forces, with detailed movements and combat performance of each separate unit on the battlefield.

The system allows achieving high level of realism in AI behavior thanks to a number of innovative approaches to AI modeling. Thus, all enemy actions are simulated using the same modeling algorithms that are used by human trainees. Among them – calculation of visibility range with due consideration of the terrain elevation model, vegetation types and overall smoke over the battlefield, revealing signs, etc. AI-driven enemies use real algorithms of command and signal exchange, target designation, distribution and guidance, units themselves feature realistic models of vehicle movement and various weapons' ballistic trajectories, etc.

Thus, the simulator modeling system can generate complex dedicated environment for real-world battlefield in accordance with combat capabilities and technical characteristics of specific weapon and other warfare types.

Another important advantage of "Combat-E" is its open architecture, allowing integration of multiple standalone simulators and/or command and control post imitators.

Kronstadt Group itself is a globally recognized manufacturer of a wide range of standalone simulators of various military equipment, ranging from trucks and armored vehicles to war ships and combat helicopters. But thanks to the support of the international information exchange standard called HLA, "Combat-E" can also integrate simulators made by third-party manufacturers, which greatly increases its flexibility and makes it a truly universal and client-oriented solution.

The modern armed forces are unimaginable without a vast array of robotics systems, including UAVs, unmanned boats, ground robots and remotely-controlled vehicles, etc. In this regard, "Combat-E" also provides a unique platform for training of operators of such robotized units, and, more importantly, training of proper coordination and interaction between conventional armed forces and unmanned units. Moreover, the system can be used as a testbed for simulating and assessing the performance of various types of robotized units, including modeling and testing of still very underdeveloped algorithms of joint behavior, or "swarm actions" by multiple unmanned units deployed within the same combat environment.

It is imminent that now, when military just like others have access to high technologies, exercises are no longer held using paper map-boards and on live battlefields, but, instead, inside meticulously created virtual environments in headquarters, units and forces fitted with high-performance equipment with latest software solutions. Kronstadt Group with its "Combat-E" combined tactical simulator makes a very compelling offering to those looking for a truly hi-tech, flexible and future-proof CSBE platform as the basis for highly efficient "digital-era" combat training. ◆

Kronstadt Group unites several leading Russian high-technology, IT and engineering companies providing both civilian and defense customers with a wide range of products and solutions, such as simulators and training systems, onboard navigation, communication and control equipment, electronic charts, geo-information systems, scalable integrated process management systems, unmanned aerial vehicles (UAV).

Headquartered in St. Petersburg, Kronstadt Group employs a strong team of over 1,300 professionals. Over 50% of the Group's employees are engineers, SW developers and IT specialists. For more information, please visit www.kronshtadt.ru.

"Without prejudice this equipment is unrivalled in this class in the world market of armaments for its totality of operational and physical characteristics, combat capabilities, and in terms of "efficiency – cost" correlation criterion. Therefore, we are awaiting continuation of procurement of BMP-3F for the Indonesian Navy"
S.S. GORESLAVSKY, DEPUTY DIRECTOR GENERAL OF ROSOBORONEXPORT JSC

Analysis of BMP-3 Combat Potential

Recently there are a lot of talks about the new and advanced examples of armored vehicles. Definitely, the advanced developments imply the significant newsworthy information, however, prior to talking about future, it is important to analyze the existing examples, and compare them with the world competitors.

Text by **Artur Volkov**

Such an approach always extends the horizon and makes it possible to move further in proper direction. What is used today, what is time-proven and does not require further improvements? Let us give consideration to the operational and physical characteristics of two versions BMP-3, BMP-3M, BMP-3 "Derivatsiya" and compare these vehicles with its closest analog, the American IFV Bradley M2A3.

LAYOUT DESCRIPTION

The crew of BMP-3 consists of three persons (commander, driver mechanic, gunner), a vehicle can accommodate seven persons of assault force with full battle-rattle, while five of seven passengers can open fire from the fire slits sitting in the folding seats. It was decided to change a traditional approach to IFV arrangement in this vehicle. Traditionally used engine arrangement in the front part of the vehicle has been changed to the tank arrangement, i.e. now the engine is located in the aft part of IFV, which imparts some advantages and some disadvantages thereto as well.

Speaking about the merits of such engine arrangement, first of all it is necessary to point out an improved field of vision for the driver mechanic as well as a fact that the power plant has now less chance to be in the line of fire, as it could have happened with its standard arrangement. Besides, the vehicle weight is distributed more advantageously along its length, which positively affects its propulsive performance (in particular, the vehicle stability in case of driving on irregular terrain).

ARMAMENT OF BMP-3

The BMP-3 is a unique vehicle in many respects. It is far from standard ones not only regarding its arrangement. The designers have provided it with quite an unusual complex of armaments for this class of armored vehicles. They include the 100-mm gun/launcher 2A70 as well as twin-barreled with it 30-mm gun 2A72 and 7.62-mm machine gun. Such armory has made it possible for the BMP-3 to acquire really unique characteristics imparting it its intrinsic specific features. It cannot but be mentioned about the accessible ammunition while on the subject of the armaments. Two types of quick-firing rounds are used: high-explosive fragmentation projectiles (HEF) and anti-tank guided missiles (ATGM) 9M117 "Basnya".

The muzzle velocity of HEF projectile is 250–355 m/s, depending on the model of ammunition used. The loading gear of semi-automatic action consists of a conveyer, charging mechanism, ramming device and empty case ejection mechanism. The conveyer provides for the location of complete rounds and displacement thereof to the line of release (to loading plane), wherefrom the complete round gets captured by the charging mechanism. The conveyer frame accommodating 22 artillery rounds stowed into trays with the flanges of cases secured in the slots of spring-loaded stops is located under the floor of combat compartment and can rotate with respect to the latter by means of electromechanical or manual (emergency) drive. The charging mechanism captures the round out of the conveyer, supplies it to the loading gear, wherefrom the round by the ramming device is delivered to a seat of gun charge (and two chains extend from a gearbox and get arranged in parallel to form a rigid

HISTORICAL NOTE

BMP-3 accepted by the army in 1987 and put into production at Kurgan Machine Building Plant had been built under the supervision of Chief Designer A. Nikonov on the newly developed basis. It was demonstrated to the world for the first time at the Moscow parade in honor of the 45th anniversary of Victory on May 9, 1990.

MAIN COUNTRIES OPERATING BMP-3

1. Azerbaijan
2. Algeria
3. Venezuela
4. Indonesia
5. Cyprus
6. Republic of Korea
7. Kuwait
8. UAE
9. Russian Federation
10. Sri Lanka

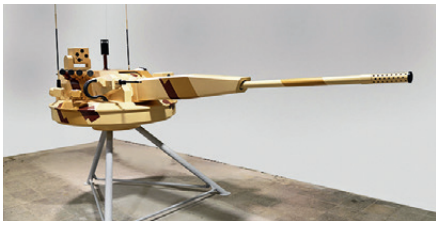
ramming element). A rear part of turret roof accommodates the attached ejection mechanism intended for removal of fired empty cases out of the vehicle. The ATGM together with the gun and control equipment forms a complex of guided armaments. The mechanism provides for the firing rate of 10 rounds/min. The ATGM guidance system is of a semi-automatic laser-beam type, the maximum range of fire is 4,000 m, and the minimum range of fire is 100 m.

MODERNIZED BMP-3M

The plans of the BMP-3 have incorporated a wide range of challenges, i.e.: increasing power and operating range of guided and unguided ammunitions, improving fire control system (FCS) in terms of enhancing searching characteristics, providing night fire and fire on unseen targets. The tasks have been also set to increase efficiency of anti-aircraft fire, expand combat capabilities of the vehicle commander, increase on-board ammunition capacity, and improve operational characteristics of the armaments complex.

In order to solve the above tasks, different designer ideas have been applied. The specific features of the BMP-3M combat compartment include, first of all, a new ammunition capacity of guided and unguided rounds, new FCS, unified loading automatic device designed to increase the rate of fire. A vertical arrangement of rounds in the loading automatic device has helped to increase the number of 100-mm rounds with the high-explosive fragmentation projectiles from 22 to 34 units, while in case of utilizing IFV without an assault force the quantity of rounds can be increased up to 100. In the process of ammunition capacity modernization the 100-mm round with guided missile 9M117M1 "Arkan" has been developed, featuring a range of fire up to 5,500 meters and a destructive warhead capable of hitting modern tanks, which are provided with the explosive-reactive armor. The ammunition ZUOF19 has also been provided for the gun 2A70 featuring improved high-explosive fragmentation characteristics, such as the coverage area of 368 square meters against 160 square meters with its predecessor.

On top of that listed above, the armory of BMP-3M has been supplemented with 30-mm cartridge with armor-piercing composite round "Kerner" featuring increased piercing performances (25 mm from a distance of 1,500 meters against 14 mm with its predecessor). It needs to be added that all the vehicles provided with a capability of applying ATGM 9M117 can use the new missiles "Arkan". Though, in case of no upgrades provided, a range of launching will be limited to 4,000 meters, while after a minimum modification of the guidance instruments in terms of increasing time of transmitter operation the range of fire can be increased up to 5,500 meters with the old BMP-3, too. ATGM "Arkan" differs from 9M117 also by the enhanced piercing



COMBAT MODULE AU220M:

1. 57-mm automatic gun BM-57 built on the basis of anti-aircraft gun S-60.
2. Twin-barreled machine-gun with caliber equal to 7.62 mm – PKTM.
3. Automatic ammunition rack for 20 rounds for a gun.
4. Up-to-date fire control system with aiming sight featuring independent sight of line.
5. Gun stabilizer.

performance; it has increased from 550 mm to 750 mm. Also, owing to the new automatic loading device BMP-3M can use ATGM at the rate of four rounds per minute, while this parameter featured two rounds per minute with the baseline version of BMP-3.

Besides this, the capabilities of anti-aircraft firing and a battle at night conditions have been improved through the installation of a thermal imaging device. The device makes it possible to fire rounds to a similar distance both day and night (5,500 meters for ATGM, 4,000 meters for 30-mm projectiles and 7,000 meters for firing 100-mm high-explosive fragmentation projectiles).

BMP-3 "DERIVATSIYA"

In the fall of 2015, a new modification of BMP-3 was introduced, the main feature of which was the uninhabited combat module AU220M "Baikal". It is, at the moment, a game changer in the field of arrangement of infantry fighting vehicles. This solution has many advantages, including those relating to the crew safety, because, as you know, the combat compartment of the vehicle gets hit in the first place. Accordingly, the availability of an uninhabited combat module helps to reduce the probability of the crew's death.

The directing gun of the module AU220M "Baikal" is a 57-mm automatic gun BM-57 built on the basis of the Soviet anti-aircraft gun S-60. This gun has a very high performance allowing it to rival (and in some respects, even surpass) the modern automatic weapons. The closest analogue of the BM-57 is the Swedish 40-mm gun Bofors L/70. Automatic gun BM-57 with a larger caliber has almost the same airspeed of explosive projectiles as those of L/70B (1,000 m/s and 1,025 m/s, respectively). But the Russian gun has a distinct advantage over all the other Western counterparts, including smaller calibers. It is the firing range of 12 km: no other IFV on the planet has this feature. Firing speed is 80 rounds/min, ammunition capacity is 200 rounds, 80 of which can be placed in an automated round rack.

This new modification of the BMP-3 puts it above the Western counterparts available on the market. Thanks to a new combat module with automatic 57-mm caliber gun, BMP-3 can solve a wide range of tasks, sometimes even without entering the enemy's field of fire. All this is achieved due to the incredibly high, by today's standards, firing range of 12 km.

There is also a very important parameter, which may be attractive in the global arms market: the AU220M combat module can be installed to replace the old inhabited combat modules without any serious financial cost to the customer. This feature makes this modification very important for the countries that have previously acquired a baseline BMP-3.

COMPARATIVE ANALYSIS OF THE BMP-3M, BMP-3 "DERIVATSIYA", AND M2A3 BRADLEY

In the analysis of the two infantry fighting vehicles we should start with one of the most important characteristics, namely, the vulnerability, as one of the tasks of the IFV is to transport infantry to the location under combat conditions. At the same time, in contrast to the armored personnel carriers, which should only deliver troops to the desired point and retreat (providing support fire during landing and securing position), the IFV should support infantry during further implementation of the combat mission.

ARMOR PLATING PARAMETERS

BMP-3M

Lower glacis plate – 57 mm, inclination of 42.5°
Central glacis plate – 57.2 mm, inclination of 25°
Armor face – 52 mm, inclination of 80°
Side armor plating of BMP-3M is 20 mm. It is possible to install a set of dynamic protection "Kaktus".

BRADLEY M2A3

Let us start with a well-armored American IFV M2A3, which has combined armor with some impressive parameters: Armor face has a thickness of 60 mm, plus armored plates, 32 mm thick, which makes it 92 mm of combined armor. The sides have the same plates that are arranged on the armor face. Side skirts are able to withstand the ingress of most 30-mm armor-piercing fragmentation projectiles. It also has a set of dynamic protection "BUSK III", which allows increasing survivability of the vehicle under conditions of active use of ATGM.

As we can see, the American IFV has higher security, but this turned it into a heavy vehicle weighing 30 tons. As a result, it is unable to overcome wide water obstacles or perform landing operations from the sea, in contrast to the BMP-3M, which weight allows it to float. Also, BMP-3M can be airlifted despite the availability of vehicles specially created for this purpose (BMD-4M, for example).

ARMAMENT AND FIRE CHARACTERISTICS

Firepower is the most important characteristic of any IFV.

BMP-3M
ATGM 9M117M1 "ARKAN"

Maximum firing range – 5.5 km, armor – 750 mm.
Projectiles "Kerner"
Maximum firing range – 4 km.
Penetration at a distance of 1.5 km – 25 mm.
Note the modification BMP-3 "Derivatsiya", with 57-mm gun having a firing range of up to 12 km.

BRADLEY M2A3
ATGM TOW-2B

Maximum firing range – 4.5 km. ATGM attacks the tank roof with double explosively formed projectile, each of them has penetration of 150 mm.

25-mm projectiles M919 – maximum firing range is 5 km. Penetration at a distance of 2 km – 65 mm.

BMP-3M is inferior to Bradley in terms of armor penetration of piercing projectiles. The American advantage arises only through the use of projectiles with uranium cores, which is irrelevant when it comes to export – the United States do not allow the delivery of weapons with uranium elements. The characteristics of the Russian 57-mm projectiles are a priori superior to the 25-mm ammunition of M2A3, both in terms of range and armor penetration. Therefore, in case of a new combat module installation BMP-3 will receive a great advantage over its American counterpart. The BMP-3M modification achieves the advantage in firepower by having a 100-mm gun, which the M2A3 Bradley lacks.

PROSPECTS

In addition to the existing line of the BMP-3 modifications well-proven in the Russian army as well as abroad, the advanced weapon platforms such as the "Armata", "Kurganets-25", and "Bumerang" are already being tested. Conceptually new IFV are being built on their bases, which will have to combine a high combat potential and an unprecedented level of protection and survivability of the crew.

Despite this, the BMP-3 will still be relevant for a long enough time, because the moment when the advanced weapons reach the state of full combat availability and overcome all their "adverse beginnings", will hardly come sooner than in 10 years' time. Note that the BMP-1 and BMP-2, as the predecessors of the BMP-3, are still operated in many armies around the world.

The installation of the new combat uninhabited module will increase the relevance of the BMP-3 for another 15–20 years, and the relatively low price of the product compared with Western counterparts, will allow exporting the vehicle for a long enough time. Unsurprisingly, even Greece, the member of NATO, planned to buy a large consignment of BMP-3 (420 units), though the deal was suspended due to the financial crisis of 2008. ◆

Fabrics of Four Elements

THE FABRICS OF KOROLEV SILK FACTORY CAN BE REFERRED TO AS THE FABRICS OF FOUR ELEMENTS – SO MUCH WIDE IS THE SPECTRUM OF APPLICATION AND MULTIFACETED IS THE FEASIBILITY OF USING THEREOF. THE PRODUCE OF KOROLEV SILK FACTORY "PEREDOVAYA TEKSTILSCHITSA" IS USED NEARLY IN ALL COMBAT ARMS FROM NAVAL- AND GROUND-BASED TO AEROSPACE UNITS. THE RELEVANT TECHNICAL CHARACTERISTICS OF WIDE RANGE OF PRODUCE HAVE SINCE LONG BROUGHT THE ENTERPRISE TO THE BEST-IN-CLASS POSITIONS IN THE INDUSTRY. THE FACTORY WORKS SUCCESSFULLY FOR AS LONG AS 140 YEARS FOR THE DEFENCE INDUSTRY UTILIZING THE BEST TRADITIONS AND UP-TO-DATE WORLD TECHNOLOGIES. AS FAR BACK AS 19TH CENTURY THE RUSSIAN REGIMENTS PLACED ORDERS HERE TO FABRICATE THEIR FLAGS AND BANNERS OF SILK AND GOLD-CLOTH. DURING THE WORLD WAR II THE PRODUCTION FACILITIES HAVE BEEN FINALLY TRANSFORMED TO "MILITARY POSTURE" TO PRODUCE INDUSTRIAL FABRICS FOR PARACHUTES, CAMOUFLAGE CLOAKS, WOOLEN CLOTH FOR TRENCH COATS. AFTER THE WAR "PEREDOVAYA TEKSTILSCHITSA" HAS BEEN COMPLETELY RE-ORIENTED TO PRODUCE FABRICS FROM ARTIFICIAL AND SYNTHETIC FIBERS.

The industrial fabrics can be universal to be used in dozens of industries, besides, they can feature specific, most frequently even unique characteristics depending on the field of application and local customer's goals. The parachutes, individual armor facilities, spacecraft, ballistic missiles...

The name "Peredovaya Tekstilschitsa" (translated as "the best textile workwoman") sounds as the deservedly acquired title. Owing to its advanced production, dozens of other companies work and advance. Supposedly, this is precisely why no German or French outfit with armor or Italian parachutes arrive at the Russian army. Today we can easily declare that the Russian aramid, polyamide, and polyether fabrics occupy one of the leading positions in the world. This is testified by the results of multiple comparison tests of articles of the best world manufacturers.

Since 1875, each new stage of development of "Peredovaya Tekstilschitsa" began from production facilities modernization. But now, the improvement of technologies neutralizes a concept of a stage in itself. The modernization now, according to Dmitriy Bruskov, Director General of "Peredovaya Tekstilschitsa", is already a permanent process. It implies that the reconstruction and technical upgrading of production facilities take place sequentially and permanently. This is the only way for the enterprise to preserve its relevancy for the military industrial complex, which is the most dynamically advancing sector of the Russian economy.

The factory follows a principle of tripartite cooperation: with the leading scientific and industrial associations, with consumers represented by the customers, and with engineers, who develop technologies of the new principles of weaving threads. A primary focus is made on the maximum-demanded high-strength fabrics based on high-molecular aramid threads, air-tight nanofabrics of polyamide threads, filtered fabrics of polyether threads.

ON THE GROUND. FOR PRODUCTION OF INDIVIDUAL PROTECTION EQUIPMENT

The most important tasks for improving characteristics of armor packages, which are successfully addressed at the enterprise, include reduction of weight and increase of flexibility with simultaneous improvement of bulletproof capacity and splinter-resistance capacity of fabric. Different structures of cloth, utilization of threads therein featuring different densities, twists, and the use of microfilament fibers provide for greater capabilities in the development of range of materials for armor vests. The fabrics for manufacturing a wide spectrum of individual protection equipment preserve mechanical strength characteristics under effect of high temperatures, too. Building sets of combat equipment "Ratnik" became one of the results of work on the new-generation fabrics.

IN THE SKY. PARACHUTE FABRICS

The parachute fabrics denote one more sphere of factory produce application. The modern production facilities help efficiently manipulate the air-tightness and fireproofness of fabrics, which give a chance to customer to attain definite targets in the use of up-to-date parachutes: whether they are personal rescue equipment, parachute cargo systems, parachute systems of combat aircraft and space reentry modules.

IN FIRE. TEMPERATURE-RESISTANT FABRICS

The next item implies the fire-proof fabrics made of heat-resistant fibers for the working temperature of 250 °C. They are used in the production of general service uniform of firefighters of the 2nd level. An additional impregnation on the basis of siloxanes and additional finish make it possible to increase the indicator of water resistance, petroleum-, oil-, and water-repellent properties, which prevent penetration of water, oils, petroleum products of high-density fraction, though, it does not prevent passage of sweat vapors at that.

IN WATER. FROM LIFE-JACKETS TO WATERBORNE VEHICLES

The fabrics made of the high-strength aramid fibers, polyamide and polyether threads are widely used for manufacturing industrial rubber goods and organic plastics. In this case a fabric is not fabric anymore but the reinforcement. The former ones are used in construction of light and robust pneumatic boats, life rafts, bridge boats, life-jackets, in aircraft- and airship-building. The EMERCOM uses the industrial rubber goods for pneumatic structures of airmobile hospitals.

The organic plastics are present in the airplane-building, in structural elements of space vehicles, in nuclear research plants, in production of bodies of ballistic intercontinental missiles "Topol-M" and "Bulava".

All the produce meets the highest standards. The factory has introduced the quality management system, which is certified according to International Standard ISO 9001:2008 (certificate No. 1510052714). It resulted in a great number and industry-specific variety of customers, which use the factory produce in their articles. The fabrics of honorary brand "Peredovaya Tekstilschitsa" live and successfully function in all four elements. The outfit of soldiers on the ground is becoming even safer, the EMERCOM officers and fire-fighters in fire and water feel protected, while the air-tight parachute fabrics guarantee a successful landing. ◆

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Inside the Cable Interconnection Manufacturing

BEE PITRON, RUSSIAN MANUFACTURER OF CABLE INTERCONNECTIONS IS INVOLVED IN LEADING EXPORT ENGINEERING PROJECTS. COMPANY DEVELOPS AND PRODUCES SPECIAL CABLE SOLUTIONS AND DATA LINES FOR AIRCRAFT ENGINES AND ON-BOARD SYSTEMS, AEROSPACE, MARINE AND GROUND EQUIPMENT.

STARTING WITH THE SMALL PROTOTYPE WORKSHOP IN SAINT PETERSBURG IN 15 YEARS BEE PITRON HAS BUILT UP A FULL-CAPACITY MANUFACTURING SYSTEM THAT PROVIDES MORE THAN 70,000 HARNESS UNITS OF 3,000 UNIQUE MODELS PER YEAR.

01

02

01, 02. Bought-in components and materials get to the 400 sq m warehouse after taking 100% quality control procedures

03, 04. Every harness unit is kitting individually as per bill of materials to be transferred to appointed assembler

03

04

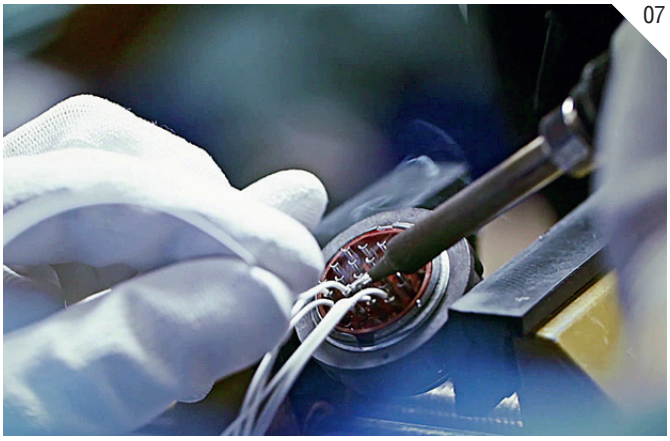
05. Harness assembly carried out at five assembling sections with 180 certified assembly workers

05

06

06, 07, 08. There key manufacturing processes are performed – harness body laying and bundling, terminals crimping and soldering, fitting of protective coverings – metal or thread braiding, heat-shrinking sleeves, plastic or metal conduits, connectors installation and protection

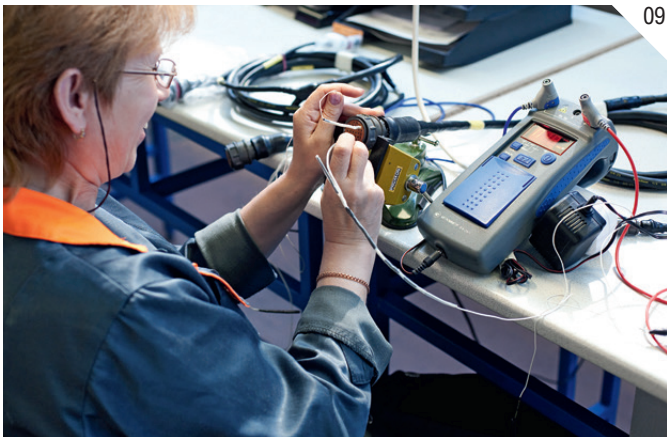
07



08

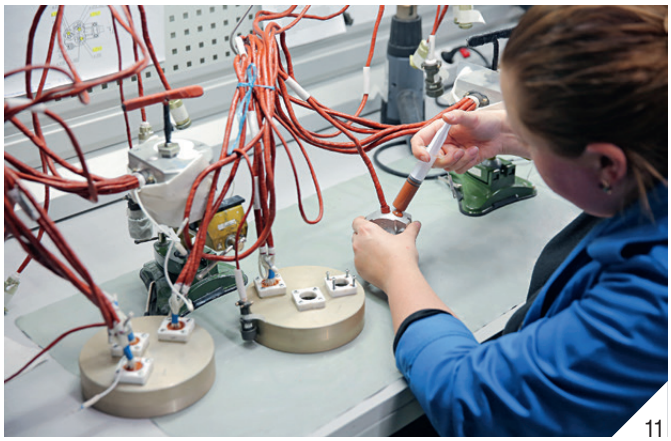
09. After the most important operations every unit is submitted to an intermediate quality check that helps to avoid waste or rework at the final production stages

09



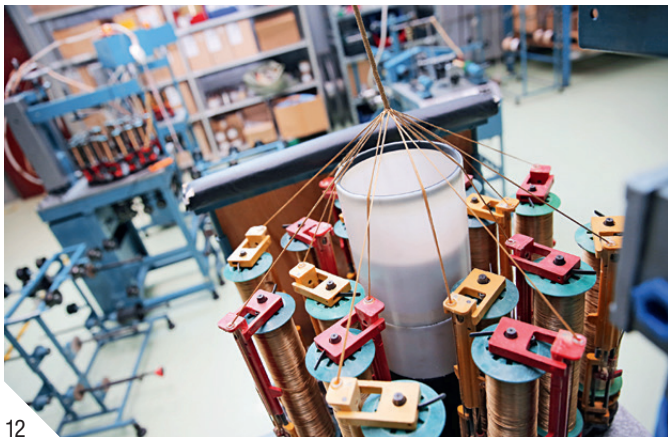
10. Since 2014 there is a fibre optic assembling section that provides special tools and equipment for optic cables and harnesses manufacturing as well as optoelectronic media converters

10



11

11. Special section is organized for activities involving adhesives and sealants. These compounds meet the operational requirements, which are applied to harsh environment products. Overmoulding is also carried out here



12

12. Bee Pitron serial workshop includes braiding section where protective jackets and sleeves are braided of aramide fibre or stainless steel wire. Braiding machines also can work with circular or flat harnesses in-process

13. Special thermal transfer printers are used for marking on cable jacket or heat-shrinking labels. Identification on connectors is engraved with laser machine

13

14. Bee Ptiron enhances its own testing facilities. Today products are checked not only for advanced list of electrical parameters but also for vibration strength with shaking system, water resistance with rain test equipment, and temperature resistance with climatic test box

14

15

15. The last stand for products at Bee Pitron workshop is package section. All harness ends are individually wrapped in plastic, the whole units are also packed in separate packs and then placed in the box as per delivery note

Bee Pitron workshop production volume increase not less than 15% every year. Manufacturing system that allows to reconfigure technological process for new assignment promptly and multilevel program of manufacturing personnel education are what provide the output growth. While the quality management system of Bee Pitron guarantees not only to keep low rejection level but to continually improve manufacturing process. ◆

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Unified Control Modules of Air Defense Tactical Units

Viktor Stepanovich Beziaev, *General Director of JSC "SIE "Rubin"*

As the local war practice has demonstrated, the combat operation success is determined primarily by the ability of military forces to resist a wide range of diverse air attack weapons (AAW) including destruction weapons air-carriers, missiles and unmanned aerial vehicles acting in jamming conditions. Independent uncoordinated actions of air defence combat vehicles and sub-units substantially decrease capabilities of the AD unit fire weapons to defend the covered military forces and objects against AAW. Integration of all AAW destruction weapons in a single automated control system (ACS) ensures improvement of effectiveness of their use, level of interaction in real time, mobility and survivability under any conditions of the combat situation.

To implement such a control system in tactical military units (TMU), the standard series of software-hardware complexes (SHC) "Barnaul-T" has been developed providing integration of diverse reconnaissance assets and destruction weapons available in the TMU AD in the single ACS. The SHC includes the wheeled planning module (MP-K) 9C931-1 for the AD unit control centre, the tracked planning module (MP) 9C931 for command posts (CP) of air defence (air defence missile) battalions, the intelligence and control modules (MRU-B) on the tracked and wheeled chassis 9C932-1 as battery command posts (BCP).

The articles 9C931-1, 9C931 and 9C932-1 hardware and unified software allow exchanging information with higher and interacting objects, providing automated control both of subordinate subunits and of fire weapons directly. Working in standard control systems one can prepare and save the setup data to connect to backup control systems in the PC memory. It allows, in case of certain CP failures, restoring control systems quickly, improving survivability and keeping operational capability of the AD unit control system under the conditions of active counterfire. The articles are mobile, which allows them to timely move following the covered military forces and to negotiate water obstacles afloat on their own. For reconnaissance of low-flying targets, MRU-B 9C932-1 is completed with a small-sized radar. If necessary, the radar maybe dismantled by the crew within 10-15 min and deployed at the distance of up to 150 m away from the article, which improves the BCP survivability when anti-radar missiles are used. The MRU-B 9C932-1 important advantage is an option to arrange independent combat operations of AD subunits from shelters and ambushes away from the main forces.


Wheeled planning module 9C931-1


Tracked planning module 9C931


Intelligence and control modules on the tracked chassis 9C932-1


Intelligence and control modules on the wheeled chassis 9C932-1


Portable fire control module 9C933


MANPADS operators automation means set 9C935

The MRU-B 9C932-1 radio facilities provide the range of communication with MP 9C931 (MP-K 9C931-1) of up to 20 km at halt, on the move – up to 10 km. The range of communication with air defence fire weapons depends on their capabilities.

At all stages of the present-day general battle, MANPADS are considered one of important AD weapons. They have repeatedly proved their effectiveness in various military conflicts. To take advantage of maximal capabilities of air defence subunits armed with MANPADS, special automation control means have been developed: the portable fire control module (PFCM) 9C933 of the platoon leader and the MANPADS operators automation means set (MOAMS) 9C935. The PFCM 9C933 allows the platoon commander to arrange interaction with the BCP on 9C932-1 and MANPADS operators section leaders via the MOAMS 9C935. The PFCM provides tracking of up to 15 air targets, automated target distribution and sending target designations to subordinate units. The PFCM range of communication with MP 9C931 or MRU-B 9C932-1 is up to 3 km, with the MOAMS – up to 500 m. The MOAMS 9C935 includes a section leader automation means set and a MANPADS operator individual target designation device. The MOAMS allows receiving information on 4 air target paths simultaneously.

The HSC "Barnaul-T" structure of the network data exchange in real time ensures collection and collating of information on the air situation in the real time air defence battle from all sources in a single information and reconnaissance field. Information on the air situation from any source is available for all control centres. Destruction weapons are controlled taking account of their resources, combat readiness, availability of free target channels, ammunition state, target engagement on the basis of a single automatic (semi-automatic) target distribution and target designation system in the entire area of responsibility of the TMU AD unit. ◆

ATU ACS 83T289-1 – Effective Antitank Unit Control Means

Viktor Stepanovich Beziaev, *General Director of JSC "SIE "Rubin"*

Experience of wars in the 20th and 21st centuries clearly demonstrated the need for the present-day army to have effective artillery means to fight against the enemy's tanks. Effectiveness of antitank artillery and antitank guided missile complexes improves significantly if they operate in a single network of antitank unit control using the automated control system (ATU ACS) 83T289-1. The system consists of a standard set of articles for automated control of the command-and-observation post (COP) of the antitank battalion (battery) commander. The battalion commander's COP is based on the command-and-observation vehicle (COV) 83T289-1.4 and the command-staff vehicle (CSV) 83T289-1.3. The COV 83T289-1.4 is used as the battery commander's COP. The articles RCOP 83T289-1.8 and RCC 83T289-1.9 from the ATU ACS are designed for arranging the remote battalion (battery) commander's COP and battalion chief of staff control centre, respectively, afield (in a field shelter, building).

The antitank battalion (battery) commander's COP ensures surveillance and reconnaissance day and night using optoelectronic devices, positioning targets within optical visibility. Processing the results of target detection, cueing and communicating the target designation to combat vehicles of batteries of self-propelled antitank guided missile complexes (ATGMC) "Shturm-S" and "Chrisantema-S", man-portable ATGMCs and guns of the antitank artillery battery and their control before and during combat operations are performed in the automated mode. The maximal "tank"-type target detection range (front projection) by the optoelectronic devices equals up to 7,000 m in the daytime, up to 5,000 m at night, the target recognition range equals up to 5,000 m in the daytime, up to 3,500 m at night.

Direct control of artillery weapons and man-portable ATGMCs from the battery commander's COP is performed through the antitank platoon commander's observation post based on the PC RCOP 83T289-1.10 and the antitank artillery gun commander's control centre (the man-portable ATGMC crew) based on the portable weapon terminal (PWT) 83T289-1.11. The articles PC RCOP 83T289-1.10 and PWT 83T289-1.11 ensure surveillance and reconnaissance day and night using optoelectronic devices, targets (reference points) automated positioning with their plotting on the ground map. Platoon, gun and crew commanders of the man-portable ATGMC are provided with an option to exchange information via data transmission channels, to receive, to process in an automated way and to display target designations, commands and control signals as well as sending reports on commands execution and data on the targets killed.

Command-and-observation vehicle of the antitank battalion (battery) commander 83T289-1.4
Command-staff vehicle of the antitank battalion chief of staff 83T289-1.3

Remote battalion/battery commander's command-and-observation post 83T289-1.8

Remote control centre 83T289-1.9

Remote platoon commander's command-and-observation post 83T289-1.10

Portable weapon terminal 83T289-1.11

Unified control software-hardware complex 83T289-1.6

The self-propelled ATGMC are included in the single network of antitank battalion (battery) control by means of integrating the unified control software-hardware complex (UCSHC) 83T289-1.6 into the platoon commander's combat vehicle (CV) and the platoon line CVs. It provides automated solution of tasks on control over the antitank platoon of the self-propelled ATGMCs at all stages of planning, before and during combat operations, reception, processing and display of target designations, commands and control signals, navigation on the march and on the move, communication of reconnaissance data, data on the targets killed to the COP.

Radio facilities of the articles 83T289-1.4 (83T289-1.3) of the battalion COP provide radio communication with the RCOP 83T289-1.4 of the battery commander at halt at the range of up to 100 km with higher and interacting objects, on the move – up to 20 km, with subordinate articles – up to 5 km. The radio communication range between the PC RCOP 83T289-1.10 and the PWT 83T289-1.11 does not exceed 2 km.

The articles ATU ACS 83T289-1 ensure continuous control of antitank units due to reconfiguration of the control system by means of transfer of functions of the failed control centres to the subordinate or higher control levels. ◆

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The 11th Russia Arms Expo International Exhibition of Arms, Military Equipment and Ammunition to be held in Nizhny Tagil in September 2017

RAE IS THE BIGGEST INTERNATIONAL EXHIBITION OF MILITARY PRODUCTS, CONDUCTED IN ACCORDANCE WITH THE FEDERAL GOVERNMENT ORDER OF JUNE 19, 2015 N 1140-P EVERY TWO YEARS. THE EVENT TRADITIONALLY CALLS TOGETHER MAJOR PARTICIPANTS IN THE ARMAMENTS MARKET.

RAE is the biggest international exhibition of military products, conducted under Russian Government auspices every two years. The event traditionally gathers major participants in the armaments market, to demonstrate military equipment and ammunition and to discuss technological innovations, relevant issues of export and state support for manufacturers. The exhibition's main goals include facilitating promotion of defence industry products to the domestic and foreign markets, enlarging the circle of overseas partners, developing business contacts between manufacturers and clients from all over the world.

The 11th Russia Arms Expo exhibition of armaments is to be held in 2017. Military equipment made in Russia and abroad will participate in the field demonstration. A multichannel television system positioned in front of the stands will help spectators follow the shooting at targets stationed at a distance of up to 50 km. Another novelty of RAE 2017 will be demonstration of the potential of military equipment, thermal imaging and infrared equipment at night. Night combat will be broadcast on displays set up in front of the stands, filmed with the use of infrared cameras. The demonstration will be combined with an extensive business program currently being developed around the key military-industrial and legal-international aspects of the world armaments market and its further development.

The guests and partners of Russia Arms Expo will be able to visit one of the world's biggest exhibitions of arms and military equipment, to see a mock battle with several branches of troops, ground attack aircraft and gunship helicopters involved, to get acquainted with the latest achievements of the national military-industrial complex and advanced world specimens of military equipment and to assess all innovations planned by the organizers in September 2017 in Nizhny Tagil.

The International Exhibition of Arms, Military Equipment and Ammunition Russia Arms Expo 2017 will be held in September 2017 in Nizhny Tagil. Leading manufacturers, design bureaux and scientific-research institutes will present their latest military-technological developments. The General Organizer of the Exhibition is SPC Uralvagonzavod, Plc, co-organizers being Business Dialogue, LLC and FSE NTIMT. ◆

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"Today, in the 21st century, the leading countries of the world are actively using the most advanced technology, the latest achievements of science: lasers, hyper-sound, robotics, in order to strengthen the military potential"

VLADIMIR PUTIN, PRESIDENT OF RUSSIA

HEAR THE HYPERSOUND

The media are increasingly reporting about the development of prospective weapons capable of changing the realities of war – the hypersonic weapons. In contrast to lasers and rail guns that usually steal the show, these weapons actually have a real chance to move from prototypes to actual combat systems that can change the world.

Text by **Leonid Nersisyan, military analyst**

To be on the same page – hypersonic speed is the speed exceeding 5 Mach (5 times faster than the speed of sound). The development of hypersonic technologies has had the most success in Russia and in the USA. Let us see how close each country has come to building the first production model of the super-fast weapon. Also, it is quite intriguing what material resources each state spends to win the "hypersonic race".

HYPERSONIC GLIDER-WARHEADS: RUSSIA IS LEADING, THE UNITED STATES ARE LAGGING BEHIND

One of the main areas of focus in hypersonic weapons is the gliders (hypersonic frames), which should replace conventional warhead intercontinental ballistic missiles (IBM) in the future. Unlike a warhead, which can also fly at hypersonic speed (about 7 km/s), the glider enters the atmosphere much earlier where it makes maneuvering and fine homing on target. Both of these facts greatly complicate the interception of a warhead by means of a missile defense system (MDS). Early entry into atmosphere does not provide time to implement the trans-atmospheric kinetic interception with MDS systems of the US GMD (Ground-Based Midcourse Defense), Aegis or THAAD type, and maneuvering in the atmosphere, combined with plasma clouds, formed around the glider because of its high speed, do not allow its interception there as well. Controllability of the glider, unlike conventional warheads, can achieve such precision of a strike that it becomes possible to use the non-nuclear warheads. Accordingly, the country possessing this technology is able to apply high-precision non-nuclear attack on any target on the Earth within 30–40 minutes (this is how long the IBM flight lasts).

In this area Russia is likely to be in the lead. Recently, on October 25, 2016, the first fully successful testing of "Article 4202" (or Yu-71) was held. This is a promising hypersonic glider, the development of which had been going on for many years. Test launches were carried out from the launching area "Dombarovsky" via legacy silo-based heavy IBM UR-100N UTTKh (according to NATO classification SS-19 mod. 2 Stiletto). At the moment, the number of carried out launches is around 10, while their results are getting better and better. This can be explained both by a great scientific advance in the field of hyper-sound remaining since the USSR times, and the fact that Russia has chosen the path of an asymmetric response

VLADIMIR KOZHIN, PRESIDENTIAL AIDE ON MILITARY-TECHNICAL COOPERATION (MTC)

"We had, are having now and will have in future one competitor in this business in the medium term – the USA. They are conducting active research and development works in all systems. We walk on parallel tracks regarding almost all modern systems that will work today and tomorrow, using weapon of new types and new principles. We are talking about laser weapons, hypersonic systems"

"We are all aware that building hypersonic weapons from scratch would be simply impossible, although the technology has reached a required level. Imagine, how should a homing device work at the speed of 8–10 Mach (1 Mach is 300 m/s)? Under these conditions, plasma forms at the surface of a missile, temperature ranges are beyond measurement. No one knew how it would affect the functioning of systems and components. Now these questions are being worked out"

BORIS OBNOSOV, DIRECTOR GENERAL OF THE TACTICAL MISSILES CORPORATION JSC

BRAHMOS-2

X-43A

The main platform for the "Article 4202" will be a promising heavy liquid IBM RS-28 "Sarmat"

to an attempt to develop a global MDS by the USA. Accordingly, Moscow focuses on the development of attack systems, not MDS, as opposed to Washington.

The main platform for the "Article 4202" will be a promising heavy liquid IBM RS-28 "Sarmat". Probably, the missile will be able to carry up to 3–4 gliders in the nuclear or the conventional equipment.

Among other things, the development of Russian hypersonic gliders is a symmetrical response to the American initiative "Prompt Global Strike" that stipulated the development of similar gliders. Projects Advanced Hypersonic Weapon (AHW) and Hypersonic Technology Vehicle 2 (HTV-2) are largely similar to the "Article 4202". However, a series of unsuccessful tests (communication with the aircraft was lost after some flight time) led to the fact that the new launches are not conducted, and the prospects for the development of production gliders remain vague.

Since 2006, around $100 million of budget funds have been spent at works on the AHW; and HTV-2 cost American taxpayers about $325 million (since 2008). In total, the creation of flying laboratories, one partially successful and three unsuccessful tests cost $425 million. An impressive amount, considering that virtually "cost-free" carrier rockets and Minotaur IV and STARS IV (special modifications of IBM LGM-118A "Peacekeeper" and UGM-27 "Polaris", subject to decommissioning, respectively) have been used for launching. These works have originally been more exploratory in nature.

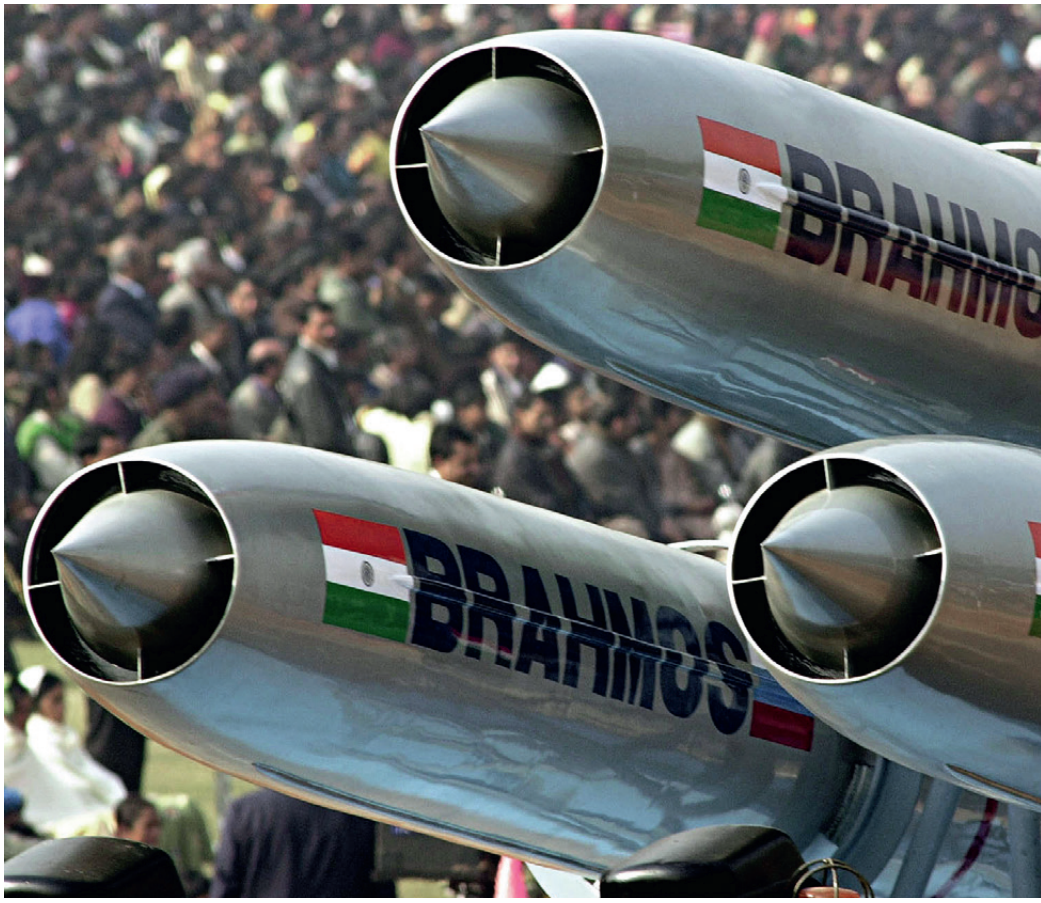
As for the Russian hypersonic glider, it is hard to estimate the cost of the project to develop "Article 4202" – we only know that the work is carried out by the NPO Mashinostroyeniya, which makes a part of the Tactical Missiles Corporation (TMC) – the rest of the information is classified. One can only assume that the development of production sample will probably cost much less than that in the USA. For example, a program to develop the fifth-generation fighter F-35 is estimated at $55 billion, while the Russian T-50 PAK FA will cost only $3 billion. Of course, this is an example of a completely different project, but on the whole this trend is relevant for most of the products of the Russian military-industrial complex – for creation of new weapons much less funds are allocated than in the USA, but the development agencies have to "stay within" the funds available. However, it is obvious that the glider will cost much more than a conventional warhead.

HYPERSONIC CRUISE MISSILES: RUSSIA CLOSE TO SUCCESS, USA DATA UNAVAILABLE

Another important direction of hypersonic weapons is cruise missiles. They can be of different types: anti-ship, aircraft, etc.

As for the USA, they do have some developments in this area. Two projects are worth mentioning. The first one is the X-43A.

Advanced Hypersonic Weapon (AHW)



BRAHMOS

This experimental cruise missile developed a tremendous speed of 9.65 Mach (1 Mach = 1 sound speed) at an altitude of about 30 kilometers. However, the missile engine worked for only about 10 seconds, so the article was nothing but a test bench. About $230 million have been allocated for the works. The second project is X-51 WaveRider, a prototype of hypersonic cruise missile, closer to the actual combat model. A total of four test missile launches were carried out, the video from the last one was published (https://www.youtube.com/watch?v=3_RrFXQViyo&feature=youtu.be). At the last test in 2013 the X-51 flew 426 kilometers, developed a top speed of 5.1 M (6,100 km/h) at an altitude of about 18 kilometers. The development of this prototype cruise missile demonstrated that the USA has the technology to provide a stable hypersonic flight at a sufficiently long distance. However, X-51 did not have any guidance system and was not designed for performing strikes – the missile was a "flying laboratory" for technologies adjustment. Over the eight years $300 million have been allocated for WaveRider from the military budget. Thus, $520 million were invested in these two research projects.

No other information on US missile projects is available, so it is impossible to judge how close the USA has come to the creation of a real combat hypersonic cruise missile. It should be noted that the most difficult technical challenge is the homing at such high speeds – the plasma cloud disrupts the work of the devices and shields signals of the GPS navigation satellites. Americans have not even tried to solve this problem on their prototypes.

In Russia, works on hypersonic cruise missiles are in full swing. Apparently, the closest to the production sample is the anti-ship missile (ASM) "Zircon". According to various estimations, it will reach speed up to 5–6 M (6–7 thousands km/h), hitting targets at ranges up to 400 kilometers. Not so long ago it was announced that Russian heavy cruisers of Project 1144 "Orlan" may obtain these weapons by 2020. This is consistent with the dates announced by Boris Obnosov, Director General of TMC (the company is engaged in all hypersonic missile projects in Russia) – according to his words, we may expect hypersonic weapons in the Russian army by early 2020s. Of course, given the complexity of the task, the timing can be somehow shifted, but the mid-2020s will almost certainly be "hypersonic". How much this ASM will cost is very difficult to evaluate. For example, the Russian export supersonic ASM P-800 "Yakhont" (its Indian modification is called BrahMos) costs approximately $5–6 million. It is logical to assume that the "Zircon", even given its superiority over predecessors, is unlikely to be purchased if its price will exceed $10 million per missile (and even this is too high). By the way, it is likely that "Zircon" is developed in an export modification as well – it has been rumored for a long time that Russia and India have plans to create a BrahMos-2 missile, and its anticipated performance characteristics are consistent with ASM "Zircon".

Works on hypersonic cruise missiles are in full swing

Another project at the final stage of testing is the aircraft cruise missile Kh-32. It will be able to develop a speed of 4–5 M – and that can be considered as threshold for hyper-sound. Most of the missile flight takes place at an altitude of 40 kilometers (there is less air resistance and hence less heat), after which it dives on its target. The maximum launch range is estimated at 1,000 kilometers. Passing of the Kh-32 into service will greatly increase the possibilities of long-range bombers Tu-22M3M (they are the main carriers of this missile). The economic component of the project corresponds approximately to that of "Zircon". It is possible that work is being done on other projects too, but so far there is no information on them.

HYPERSONIC AIRCRAFT: AMERICAN RECONNAISSANCE AIRCRAFT SR-72 WILL NOT APPEAR UNTIL 2030

Another category of long-term hypersonic weapon is the aviation. It can be both

X-51A

Lockheed Martin consept SR-72

Russia is at the forefront of the "hypersonic race"

information available. As for hypersonic attack aircraft, their creation is an even more complex task, as there are such difficulties as the separation of weapons from the carrier at blazing speeds, the increased weight of an aircraft, etc. A simpler and more elegant solution at the present technological level is to equip the traditional subsonic or supersonic bombers with long-range hypersonic cruise missiles.

CONCLUSION

From the above we can conclude that Russia is at the forefront of the "hypersonic race", as judged by the information available to the public. The reason for this is a great scientific potential, inherited from the USSR. However, the USA also has some success in the field of hyper-sound, and the lack of information about new projects implies that works are carried out in secrecy. In any case, the world came close to the new speeds that will make the balance of forces on the planet even more precarious. As for hypersonic aircraft, including civil aviation, then we should not expect its appearance in the next 15–20 years.

The "hypersonic race" does not provide any economic risks for the participants, because it has not yet reached the mass-produced samples and attempts to overtake an opponent in production volumes. And the sums that the USA and Russia allocate fit well into the existing defense budgets. For the USA the amount of $2 billion spent over the years for "hyper-sound" is a meager sum (at an annual military budget of about $600 billion). For example, an obviously hopeless Boeing YAL-1 MDS aircraft laser project cost $5 billion, after which the project was closed. For Russia, such amounts are also quite manageable, especially given the country's reliance on the development of strike systems to counter the global MDS deployed by the USA. ◆

SERGEY BOYEV,
GENERAL DESIGNER OF MWS AND DIRECTOR GENERAL OF THE MINTS RADIO-TECHNICAL INSTITUTE (RTI)

"To say that we now have a silver bullet against hypersonic weapons would be an exaggeration. But we are paying close attention to this topic: our "Voronezh" type stations are able to detect hypersonic targets; beyond-the-horizon radar detection has some significant potential. From the point of view of work on missile defense conducted by our colleagues from the Almaz-Antey Concern, there is also some major success"

manned and unmanned. Given that the presence of a pilot increases the weight and impairs the aerodynamics of the aircraft a priori, and the aircraft operation at hypersonic speeds will be extremely challenging, the only project in this category is being developed in an unmanned configuration. We are talking about the US unmanned reconnaissance aircraft SR-72, the work on which have been reported this year by an industrial giant Lockheed Martin. The task is very difficult – the aircraft will have to carry out flight at speed up to 6 M with the first prototype, being a technology demonstrator, is to take off in 2023 (up to this point it is planned to spend about $1 billion), and the finished product is expected to be adopted into service by the USA in 2030. Of course, it is very difficult to talk about the deadlines and accurate estimations when it comes to such projects – a lot will depend on the success of tests and funding (a completely disastrous scenario is also a possibility). Currently, SR-72 is the only hypersonic aircraft with at least some development

SU-30. RUSSIAN EAGLE LAYING GOLDEN EGGS

This summer it will be 20 years since the maiden flight of Su-30MKI prototype, the most prominent representative of the most successful Russian family of fighters, took place. The foreign orders alone exceed already five hundred aircraft, and new contracts continue to be signed.

Text
by Alexander Ermakov

SU-30 MKI

The Su-30 program roots back to the last years of the USSR existence. Strange as it may seem, but such a comprehensive plane fully compliant with the concept of the modern multifunctional 4+ generation fighter originated from the program of combat trainers' cosmetic upgrading. Su-27UB, a two-seater version of the leading-edge Su-27 began to arrive in the armed forces at the end of 1987. As far back as in the course of testing Su-27 plane, the experts from air defense forces of the country have noticed a loitering interceptor potential in it to replace the obsolescent Tu-128, and the two-seater version suited this mission ideally: during hours-long flight two crew members share the load, including psychological one, while in case of complex circumstances the operator can focus his attention on tactical situation, including control of single-seater fighters, and avoid distraction for piloting.

In order to fulfill functions of loitering interceptor, it was required to provide even greater flight range by means of in-flight refueling and to install additional cockpit equipment. There also were some other necessary "small details": providing large stock of oxygen and an additional cockpit space for greater reserves of water and food stuffs, after all the flight missions up to 10 hours may be possible according to technical assignment! The work on the plane designated as Su-27UBP began in May 1987. The follow-on development of two prototypes of dual-control aircraft into a new version began in 1988 at Irkutsk Aviation Plant, namely at that factory Su-27UB had been manufactured (while the single-seaters have been manufactured in Komsomolsk-on-Amur). The updated plane made its maiden flight on October 4, 1988. At the end of 1990 it was decided, proceeding from the test results, to launch production of the updated machine designated Su-30 in 1992 at Irkutsk Aviation Plant replacing the original Su-27UB planes. However, these hopes never materialized due to the known reasons, and only nine original Su-30 have been manufactured.

INDIAN BREAKTHROUGH

Su-30 would have anyway remained in the line of those projects that failed to cut out a place for themselves after disintegration of the USSR and perished without a ripple, unless the works on building the export version featuring extended capabilities for hitting ground targets, a real multi-purpose fighter had started as far back as the end of 1991. Probably, a successful combat debut of F-15E "Strike Eagle" during the "Desert Storm" operation played its role too,

COLONEL GENERAL VIKTOR BONDAREV, COMMANDER OF RUSSIAN AEROSPACE FORCES

"We procure these planes every year, practically we will get up to one wing of Su-30SM, i.e. 20–24 a year"

SU-30 MKI

TONY OSBORN, AVIATION WEEK EXPERT

"Su-30 in the right hands is definitely capable of giving a potent rebuff to a serious enemy"

SU-35

India became the first and the biggest buyer of the planes of Su-30 family. The first contract was followed by the additional ones, including the greatest program of establishing licensed production at HAL company plant

SU-27 UBM

because it had been also updated from a "pure" fighter to the multi-purpose plane. Four of nine original Su-30 not procured by the Ministry of Defense had actively got involved into marketing and took part in exhibitions all over the world: Su-30MK made its first appearance in 1993 at the time looking like regular Su-30 with suspended guided bombs and "air-to-ground" missiles.

A buyer appeared there quite soon, in 1994 negotiations started with the Indian party, while on November 30, 1996 the contract was signed for the delivery of 40 Su-30MKI fighters. Su-30MKI had significant differences from its initial appearance, as follows: brand new avionics, in particular, side-looking airborne radar with phased antenna array, essential integration of foreign systems, engines with thrust-vectoring module, enhanced landing gear. The canard surfaces tried-and-true at the ship-borne Su-33 and Su-27M (more known as the first Su-35) became the most externally prominent difference and turned out to be a "landmark" of Su-30 from Irkutsk, they increased a margin of pitching instability and improved the plane agility. The maiden flight of the prototype (one of the original Su-30 following upgrading) took place on July 1, 1997 in Zhukovsky (near Moscow).

The tests have turned out to be complicated and intense, it was a brand new machine with respect to flight performance and, especially, with respect to equipment. The maiden flight of the first serial Su-30MKI took place on December 28, 2001, while the first batch was accepted by Indian Air Force in the autumn of 2002. Moreover, the joint tests of avionics and armaments continued at that time in Russia. Besides, it was taken into account beforehand that it would take time to build a fundamentally more sophisticated aircraft ordered by India. In order to begin mastering the equipment by the flight and maintenance personnel, 18 Su-30K were procured in 1996–1998, which basically copied the original Su-30 with slight changes due to installation of satellite navigation system. According to contractual conditions, these planes have been subsequently replaced with the full-fledged Su-30MKI and made way to the Republic of Belarus, where they get modernized at the 558th aircraft repair plant pending sales to Angola.

India became the first and the biggest buyer of the planes of Su-30 family. The first contract was followed by the additional ones, including the greatest program of establishing licensed production at HAL company plant. The first "Indian" Su-30MKI left the gate of the assembly shop in November 2004. Initially, it actually was a screwdriver assembly, later the localization increased significantly, but until now completely knocked down kits are sent from Irkutsk to India. Presently, the total amount of Su-30MKI orders has reached 272 aircraft. The short-range plans include closing contract for deep modernization according to the program known in the media as "Super Sukhoi". The amount of contract for modernization of 194 aircraft can reach $8 bln. The exact technical concept of the promising plane is not known, one can speak with confidence about renovation of avionics (in particular, installation of new side-looking airborne radar), reduction of radar signature and extension of armaments range. Nowadays, they carry out works in India in order to include the aircraft version of supersonic cruise missile "BrahMos" into armament of Su-30MKI, which will probably make it the most powerful striking complex of tactical aviation in the world.

YOUNGER BROTHER

One of the unique peculiarities of Su-30 family consists in the fact that it is not one line developing gradually, but two branches of genealogic tree divided at the very beginning and developed in parallel and independently. The aforementioned Su-30MKI, the same as the original Su-30, has been manufactured at Irkutsk Aviation Plant, the

SU-30 SM

management of which played an immense role in building the plane and promoting it to the Indian market. However, simultaneously with these events the other biggest Russian aircraft factory involved in the manufacture of fighters, Komsomolsk-on-Amur Production Association (now Komsomolsk-on-Amur Aircraft Factory), has been developing partnership with China. The biggest contracts were executed for supplying Su-27SK and Su-27UBK fighters thereto, which had been concluded as far back as the last year of the USSR existence. Despite the fact that future measures on organization of licensed production provoked a situation when China abandoned further purchases and launched production of a counterfeit copy – J-11, there is no need to address these transactions negatively, since they provided survival for the Russian aircraft manufacturers during that difficult historical period.

China being in the state of arms race with India got interested in the procurement of Su-30 as far back as 1996–1997, in this case its requirements have been somewhat lowlier, first of all it was required to extend the capabilities of original Su-27 for hitting ground targets by means of guided weapons. Also, the Chinese have planned to continue cooperation with the partners from Komsomolsk-on-Amur, and that created certain difficulties, since they had produced single-seater "Sukhoi" aircraft only.

The contract with China for procurement of Su-30MKK was signed in 1999, by that time the work was in full swing already. The plane was built within the shortest possible time, which was, though, favored by the less amount of novelties incorporated into airplane. The visually noticeable differences between Su-30MKK and Su-27UB are the tail fins increased by height with horizontal vertical edge. Needless to say that avionics has been improved, cockpit equipment was renewed, and a possibility of using wide spectrum of guided "air-to-ground" weapons was provided. Though Su-30MKK was preserved to the full extent and the capabilities of "air-to-air" operations were even extended as compared with the original Su-27, it is, first and foremost, the strike machine. The tests of Su-30 from Komsomolsk advanced fast, the first batch was moved to China during the last days of 2000!

Totally, China has acquired 76 Su-30MKK and 24 Su-30MK2, the versions for Coast Air Forces of Chinese Navy with improved avionics, first of all for fighting the surface targets. The further procurements are not planned, but there was no copying as well, though the experience of operation and technical solutions of Su-30MKK/MK2 have been used by China, no doubt, in the development of its family of J-11. One of the newest representatives – J-16, which, seemingly, has just begun to arrive at the armed forces, is considered to be the local analog of Su-30.

AIRCRAFT PERFORMANCE (SU-30SM)

Takeoff weight (normal/maximum), kg, 24,900 / 34,500
Fuel reserve, kg, 5,270 / 9,640
Maximum thrust of AL-31FP engines with afterburner, kg, 2x12,500 kgf
Maximum flight range, km
- near ground – 1,270
- at altitude – 3,000
- with one in-flight refueling – 5,200

Minimum takeoff run, m, 550
Maximum landing roll, m, 750
Maximum speed near ground, km/h, 1,350
Maximum speed (at altitude), M, 1.9
Service ceiling, m, 17,300
Limit load factor, unit, 9
Dimensions (length/wing span/height), m, 21.9/14.7/6.4

SUCCESS IN THE WORLD AS A STEP TO RETURNING HOME

The contracts with India and China made the basis for two branches of development of Su-30 and laid a robust foundation for further development, however, if everyone confines himself to these contracts only, the plane could not have been called with good reason as the main bestseller of the Russian aviation industry.

The Irkutsk machines have strengthened their presence in Asia and penetrated into the Northern Africa. In 2002, negotiations began on supplying a variant of Su-30MKI to Malaysia, and beginning from 2005, to Algeria (initially the latter gave consideration to the aircraft from Komsomolsk, but took a decision in favor of a more sophisticated one from Irkutsk). In both cases, special modifications of fighters have been built for the buyers, Su-30MKM and Su-30MKI(A), accordingly. The main differences consisted in avionics, the Malaysian machine differs by additional systems, in particular, by the sensors registering the plane illumination with laser ranging devices, and by replacing a number of foreign components with politically more convenient; the Algerian one is much more closer to an Indian original (which can be seen from designation), it differs, basically, by the replaced components of avionics produced in Israel with the analogs thereof. Altogether 18 units of Su-30MKM have been procured, and 58 Su-30MKI(A) according to three contracts, the third one was closed in 2015, and supplies have just begun according to it.

ARMAMENTS (SU-30SM):

– "air-to-air" guided missiles RVV-SD, RVV-MD, R-27R/T, R-73 with IR homing devices;

– anti-ship missile X-31A, anti-radar missile X-31P;

– "air-to-ground" guided missiles X-29TD(L), X-59ME;

– guided bomb KAB-500Kr, KAB-1500Kr (VD, LH);

– unguided bombs, missiles, cassettes;

– internal gun GSh-30-1

– up to 8,000 kg at 12 hardpoints

F-15

The machine, really successful, advanced and free from childhood diseases (solved due to foreign orders, literally) cannot help but interest the Russian Air Force. In 2012, the first contracts were concluded for buying Su-30 from Irkutsk designated Su-30SM for the Russian Air Force. According to information available, the technical concept thereof is based on Su-30MKM with a decreased amount of foreign components and a number of improved components; side-looking airborne radar, ejection seats, etc. By now, the foreign components have been completely replaced with Russian analogs at the planes supplied now. Su-30SM fighters are supplied for export to the closest Russian allies, so Kazakhstan received the first four fighters in 2015, it began training pilots on these planes pending arrival of the new planes, it is planned to bring this number to 32 by the beginning of the next decade. The procurement of Su-30SM for the Air Force of the Republic of Belarus is a possibility in the nearest future.

However, the main buyer of Su-30 now is the Russian Air Force and Navy at last, in a quarter of a century after the first Su-30 began to be assembled at Irkutsk Aviation Plant. In general, by the end of 2016, 116 planes (88 for Air Force, 28 for Navy) have been contracted already; additional orders are to be expected. It is not impossible that the number of Su-30SM in the Russian Air Force will come close to 200 units. At the end of 2016 the "landmark" of the Russian Air Force, the aerobatics aviation group "Russkye vityazi" have changed their planes for Su-30SM.

Beginning in the spring of 2016, Rosoboronexport deals with promoting to the world market a new version of Su-30, namely, Su-30SME, which differs, most probably, from its predecessors by the above mentioned improvements incorporated into Su-30SM. In case of advances with the Russian-Indian "Super Sukhoi", the improvements proven thereat will be most probably incorporated with the other users too, and the fundamentally renovated version of new-generation Su-30MK will be promoted for export.

The machines from Komsomolsk being cheaper and simpler have gained a greater spread, they have been procured by Venezuela (24 planes), Vietnam (the biggest buyer after China – 60 planes), Indonesia (11 planes) and even such exotic country as Uganda (six planes). There were orders for the Russian Air Force too, though, they were relatively small: 20 Su-30M2 planes have been procured. They have replaced Su-27UB in the air force units that have used up service life most of all; the load is especially high on the two-seater planes since they are periodically used for training young pilots and skills restoration after any interval in flights. In this case, a relative proximity of Su-30M2 equipment and capabilities and Su-27SM that have passed overhaul and upgrading is also to the good.

At the present moment the production of Su-30 from Komsomolsk is stopped, at the end of 2016 the last Su-30MK2 from Vietnamese order left the factory. From now the factory will entirely focus on the production of the 5th generation T-50 fighters and on maximum development of Su-35S as the member of Su-27 family. At that, Su-35S is not only produced for the Russian Air Force, but started to be supplied for export – the contract was closed with China for 24 planes, a coordination of transaction with Indonesia is expected. Besides, it is impossible to fully exclude a resumption of production in case of receiving new orders. So, Venezuela demonstrated interest in buying an additional batch, however, the difficult economic situation in the country is an obstacle there.

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Though Su-30 was contemplated as a small upgrade of the combat trainer for the needs of air defense, it was reborn in the years most difficult for the aviation industry of the country to become the export-oriented multi-purpose machine featuring high striking and unique maneuvering performance. It has not only returned home as the production- and army-proven backbone of a new appearance of the Russian Air Force, but has shown itself in the markets of the whole world. Now Su-30 is not only a symbol and bestseller of the Russian military export together with T-90 tank and air defense missile systems of S-300 family, but the most mass-produced and sold heavy fighter in the world. ◆

RESEARCH-AND-PRODUCTION EXPERIMENTAL CENTER ARMINT:

BUILDING TECHNICAL FACILITIES OF OBJECTIVE CONTROL AND RESULTS EVALUATION OF COMBAT EMPLOYMENT OF AIR DEFENSE AND AIR FORCE MILITARY EQUIPMENT IS THE BASIS FOR INCREASING EFFICIENCY OF TROOPS TRAINING IN THE FIRING RANGES OF THE MINISTRY OF DEFENSE OF RUSSIA

Research-and-Production Experimental Center Armint is the only Russian development agency and manufacturer of the range optical and electronic systems for control and evaluation of results of combat employment of anti-aircraft weapons and air-delivered ordnance on airborne and ground targets (shooting marks).

BUILDING AUTOMATED SYSTEMS OF INFORMATION AND MEASUREMENT SUPPORT OF TESTS AND MEASURES OF TROOPS TRAINING

Research-and-Production Experimental Center Armint was established in March 1999. The professional basis of the center is formed by the reserve officers, including military scientists of test ranges and cosmodromes, leading R&D Institutes of the Ministry of Defense of the Russian Federation as well as employees of the headquarters of military branches and arms of the Ministry of Defense of the Russian Federation.

The subject and target of RPEC Armint OJSC activity is the building of the range automated systems of information and measurement support for testing advanced weapons and military equipment as well as performing gunnery drills and bombardments in the course of troops training.

In order to implement the subject and target of activity, the Center performs a number of research and development works according to the orders of the Ministry of Defense of the Russian Federation and the defense industry complex. Subsequent to the results of work 17 favorable decisions and patents for inventions have been received. The Quality Management System and the Scientific and Technical Research Council work at the enterprise.

RPEC Armint OJSC team owing to its concerted scientific and technical activity has developed the geographically-distributed automated 9Sh320 system "Konglomerat-1P", manufactures it presently in series, supplies to the firing ranges of the Ministry of Defense of the Russian Federation and operates successfully. This system provides solving tasks of monitoring, results evaluation of live firing exercises of anti-aircraft defense systems of various types as well as safety of conducting firing exercises in the firing ranges.

In order to solve tasks for its intended purpose, 9Sh320 system is furnished with the devices of optical and electronic equipment, communication, station of gathering, processing and presenting video and measurement data on the progress and results of live firing exercises. The structural specific feature of the foregoing system components is that they are the subscribers of data exchange wide-area network organized on the basis of radio relay communication lines functioning in the authorized frequency bandwidth (implemented while organizing Wi-Fi technology).

The obtained results of 9Sh320 system application in the course of performing combat training measures in the firing ranges of the Ministry of Defense of the Russian Federation have demonstrated that the above system can be used as a universal technical facility of objective control and results evaluation of performed live firing exercises carried out by the anti-aircraft defense experts in the course of annual all-Russia as well as International competitions "Experts of Air Defense Battle" and "Clear Sky" being carried out in the firing ranges of the Ministry of Defense of the Russian Federation.

Proceeding from the results of 9Sh320 system employment in 2016 as a technical facility of objective control and results evaluation of the International competition "Clear Sky" being carried out in the frame of military international games "ArMI-2016", the Commander-in-Chief of the Ground Forces distinguished the achievements of RPEC Armint OJSC team by the letter of gratitude. ◆

БЛАГОДАРНОСТЬ

ГЛАВНОКОМАНДУЮЩЕГО СУХОПУТНЫМИ ВОЙСКАМИ

Research-and-Production Experimental Center Armint Open Joint-Stock Company

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"In fact, high-precision weapons are now becoming an alternative to nuclear weapons"
PRESIDENT OF RUSSIA VLADIMIR PUTIN

RUSSIAN AIRBORNE GUIDED WEAPONS. CURRENT STATE AND THE FUTURE

For the years that passed since the commencement of a large-scale military reform initiated in 2008, the Russian Aerospace Forces (RAF) have incredibly changed. They have received many new aircraft. Four wings of the Su-35S fighters, almost seven wings of the Su-30SM and Su-30M2 fighters, three wings of the MiG-29SMT fighters, a wing of the Su-27SM3 fighters, and five wings of the Su-34 frontline bombers – this is only an incomplete list of the newest aircraft received by the RAF under the State Arms Program to be implemented by 2020. A larger number of aircraft have passed modernization. Army air force units have received over 200 new attack helicopters such as the Mi-28N, Ka-52, and Mi-35M, including a larger number of transport helicopters. Moreover, by 2020 the RAF will totally receive almost 600 new aircraft of various types, plus about 1,000 various helicopters.

New airborne weapons are concurrently being developed, because such weapons define the actual efficiency of combat airplanes and helicopters to a great extent.

This is crucial for fighter aviation, because as far back as in 1990s most of fighters operated by air forces in NATO countries were basically provided with the next-gen AIM-120C "air-to-air" missiles equipped with active target-seeking devices (TSD).

Missiles with semi-active TSD are guided to their targets using the target's radar echo and, therefore, the target should be "illuminated" by the carrier aircraft onboard radar until the very moment of target hit. This substantially limits aircraft maneuvering during air fights. But missiles with active TSD require only radar correction by means of commands from the carrier aircraft onboard radar while passing the initial leg of the trajectory, and then they are able to lock on target without guidance. Actually, an active TSD is designed as a mini-radar installed in the nose part of a missile, able to detect and lock on a target that belongs to the fighter-class targets (without stealth application) at a distance of 10–15 km. With respect to effective range of 25–30 kilometers for medium-range "air-to-air" missiles, this already gives a great advantage in air fighting. Besides, immediately after launching a missile with the active TDS, an aircraft may perform any maneuvers while a missile may fly through the initial flight leg, using the inertial autopilot; however, in this case the probability of kill will be dramatically decreased. When launching a missile equipped with the semi-active target-seeking device, an abrupt maneuver (for example, a 90-degree turn) will lead to failed lock-on and a missile will miss the target. Therefore, missiles equipped with active TSD give

BORIS OBNOSOV, DIRECTOR GENERAL OF TACTICAL MISSILES CORPORATION

"Over 20 new missile models are currently being developed for the Russian Army"

AIM-120C

"As NATO – in particular, the USA, – is investing large amounts of money in high-precision weapons and total control systems, Russia is using its own technical capabilities to minimize costs,"
CONTRA MAGAZIN, AN AUSTRIAN NEWS MEDIA COMPANY

"Within the scope of the state defence order, a number of supplied high-precision weapons, in particular, missile systems and ship-based and airborne missiles, have increased several times,"
YURIY BORISOV, DEPUTY MINISTER OF DEFENCE OF THE RUSSIAN FEDERATION

a great advantage in long-range air combat, irrespective of aircraft flight performance.

RUSSIAN "AIR-TO-AIR" MISSILES ARE COMPETITIVE WITH WESTERN EQUIVALENTS

In the late 1980s, the USSR developed the R-77 missile equipped with the active target seeker. Like the US AIM-120C missile being developed at that time, this missile was intended to be installed inside internal weapon bays onboard not only the existing 4th generation fighters, but also then prospective 5th generation fighters. Only 200 R-77 missiles were produced by 1992. In the late 1990s, Design Bureau Vympel (the developer of the R-77 missile) developed an export version of this missile designated RVV-AE. A large number of these missiles were exported to India and China, as well as to other countries operating Russian 4+ generation fighters. In the late 2000s, an improved modification of the R-77 missile – the RVV-SD missile – was developed. It featured better performance and was practically identical to the modern modifications of the US AIM-120C missile in terms of combat capabilities. Tactical Missiles Corporation (TMC is the main developer of high-precision weapons in Russia) entered a contract for large-scale production of the RVV-SD missiles to be supplied in 2016–2017. As early as late 2016, a large amount of these missiles are really expected to be supplied to regular units of the Russian RAF.

In addition to the RVV-SD missile, the new all-aspect short-range RVV-MD missile based on the R-73 missile has been developed along with the new long-range RVV-BD missile. The first works on developing a new long-range missile were started as far back as the 1980s. The missile designated R-37 was intended to replace the R-33 missile used as the "major caliber" of the MiG-31 interceptor. The RVV-BD missile passed the tests and was officially put into service in 2014. This missile is used to equip modified MiG-31BM fighter interceptors and is expected to be installed on other aircraft (including the 5th generation T-50 PAK FA fighter). Accurate data on its performance is unclear, but its maximum range is estimated to reach up to 300 kilometers. It is evident that the effective range of these missiles when firing at a fighter-class target is substantially lower, but anyway it is far longer than the effective range of the existing medium-range missiles.

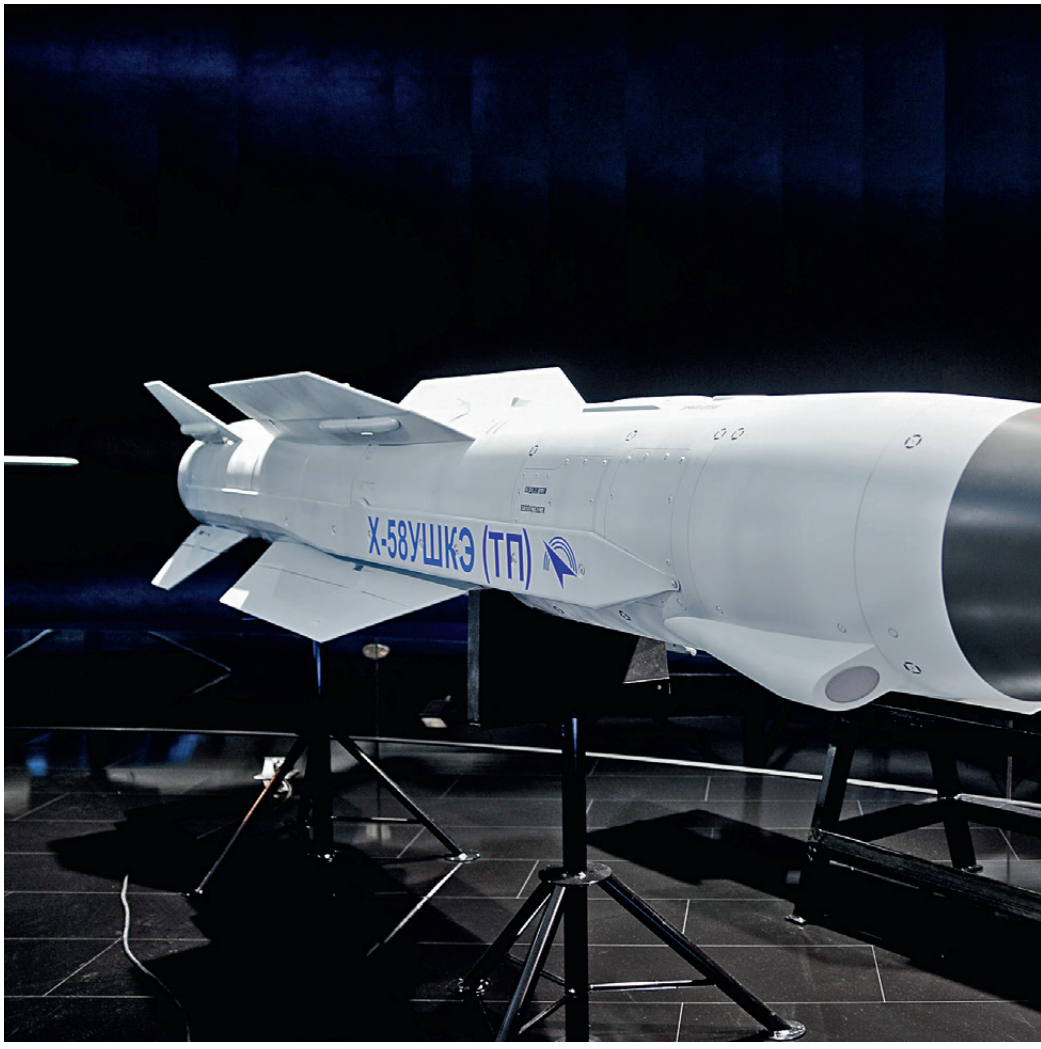
Another excellent parameter is the estimated lock-on range of the missile active TDS to reach 40 kilometers for targets with the effective reflective area equal to 5 sq. meters. The RVV-BD missile is basically designed to hit the enemy's cruise missiles within a long range, as well as their carriers. The application of such missiles may at least disorganize the enemy, disturb its flight formations and have the most severe shock effect on the enemy. The RVV-BD missile will allow to substantially widen combat capabilities of Russian MiG-31BM and successfully destroy the enemy's cruise missiles at a substantially longer distance and even hit long-range radar detection (LRRD) aircraft and airborne command centers. Note that no country in the world has equivalents to this missile. Moreover, an available option to install the RVV-BD missile on the T-50 PAK FA and its Russian-Indian modification FGFA makes this aircraft more attractive for the world arms market players.

GUIDED "AIR-TO-SURFACE" AIRBORNE WEAPONS

Basically, the term "high-precision weapon" (HPW) means various types of "air-to-surface" class guided munitions. Since their appearance on the scene in the early 1970s, these munitions allowed to reach a several-fold, even a ten-fold increase in efficiency of attack aircraft. A single aircraft became able to deliver surgical strikes on hard-to-reach targets, the termination of which with conventional munitions often required tens of sorties and hundreds of dumb bombs.

Despite some gap in development of high-precision munitions in comparison to NATO, the Soviet Union had managed to produce huge arsenals of various types of

Kh-38ML



Kh-58

such weapons. Aircraft operated by tens of attack, bomber and fighter-bomber aircraft wings were armed with the widest number of various types of guided weapons.

During wars in Chechnya and South Ossetia, high-precision munitions made a small part of the total amount of applied air weapons. Nonetheless, the application of guided air-delivered munitions during the above-mentioned conflicts provided wide experience in combat tests under real conditions. For example, during the war in South Ossetia, the Kh-31P anti-radar missiles and the KAB-500S satellite-guided bombs were successfully tested.

Let's make a short digression concerning the high-precision weapon application concept used for Russian armed forces. Russian military authorities take a reasonable approach to use high-precision weapons to hit only the most important and hard-to-reach targets, i.e. enemy's military infrastructure facilities such as bridges, storage facilities, bunching troops, command posts, air defense systems, etc. This approach compensates its high costs. For instance, the cost of a single guided air bomb is practically equivalent to the cost of the amount of conventional "dumb" bombs required for a sortie of the whole wing. In NATO, the application of high-precision weapons is worshipped while the most extensive use of such weapons often gives controversial results, plus an enormous rise in the cost of a military operation. For example, the costs of NATO's air operations against Yugoslavia nearly exceeded damage inflicted on the enemy. During the air operations in Libya in 2011, the extensive use of high-precision weapons by French and British air forces actually depleted arsenals in these countries for two months. Moreover, such extensive use of high-precision weapons did not help to drastically reduce civilian casualties.

Nonetheless, arsenals with a large amount of high-precision weapons should be available in case of war against a tough enemy. By the commencement of a large-scale military reform in 2008, the high-precision weapon arsenal for Russian attack aircraft was based on the Kh-25L, Kh-29L and Kh-29T missiles with laser and television target-seeking devices, Kh-58 and Kh-25MR antiradar missiles, as well as the KAK-500L and KAB-1500L guided bombs with laser TSD. Russian air-derived high-precision munitions were basically inferior to Western equivalents; certain types of these weapons were not available for Russian military aviation, such as flying bombs (for example, the US flying bombs JSOW) and tactical air-delivered cruise missiles (CM), such as the US tactical cruise missile AGM-158 JASSM and European Storm Shadow.

In the 2000s, Russia launched the production of the Kh-31P antiradar missiles and KAB-500S guided bombs equipped with a satellite target-seeking system. For the period that passed since the commencement of the military reform, TMC has managed to make the best use of the design of Soviet missiles and develop advanced modifications of the Kh-25 missiles equipped with a television and active radar TSD and substantially enhance performance of the Kh-29 missiles. The Russian RAF have already received the Kh-59MK and Kh-59MK2 long-range tactical cruise missiles, which, unlike their predecessor – the Kh-59 missile – are equipped with an inertial guidance system together with an active TSD instead of a television-command system.

NEW RUSSIAN "AIR-TO-SURFACE" MISSILES – A SMART REPLY TO NATO PRODUCTS

In recent years, a significant progress has been achieved in development of high-precision munitions. In late 2012, RAF received a newly developed Kh-38 missile intended to replace the obsolescent Kh-29 missiles. The Kh-38 missile is available in different versions equipped with any target-seeking devices – laser, television, satellite, and active radar TSD. At MAKS-2015 Air Show, TMC exhibited a wide range of new air-delivered guided munitions, including the "Grom-1" tactical CM and the "Grom-2" guided smart bomb based on the Kh-38 missile. The modified version of the Kh-59MK2 missile was represented as well. By

R-77

Kh-59MK2

KAB-500S

USA JDAM bomb

the way, this modification is actually a new missile featuring a different exterior shape and content in comparison to the basic version of the Kh-59 missile. In fact, it is a full-featured air-delivered CM and a smart reply to foreign-made JASSM and Storm Shadow cruise missiles. These missiles are intended to enlarge the weapon list for modern Russian aircraft such as the Su-34, Su-35S, Su-30SM, MiG-29K, etc.

"GEFEST": DUMB WEAPONS FOR HIGH-PRECISION STRIKES

Strike accuracy of dumb bombs has substantially increased as they are still used by attack aircraft to deliver most of strikes during modern warfare. To improve strike accuracy of dumb bombs, the USA largely equips them with special JDAM systems. These systems are designed as a set of control surfaces combined with a self-guidance system (laser or satellite) to turn flying bombs into high-precision munitions (although, strike accuracy of such bombs is many times lower than accuracy of full-features smart bombs).

Russia has already developed the SVP-24 "Gefest" special computing subsystems and started to install them on a large number of aircraft. The "Gefest" systems are able to compute the point to be hit by air bombs with the highest accuracy, using all physical parameters such as aircraft speed and attitude, air temperature and density. As a result, this allowed to achieve incredible strike accuracy of air bombs. A dumb bomb launched by an aircraft equipped with this system at an altitude of 5 kilometers may hit the circle with a diameter of about 25–30 meters. This system provides strike accuracy of dumb bombs comparable to accuracy of the US JDAM systems, but installation of such a system on aircraft is much cheaper than equipping American dumb bombs with the JDAM systems. Due to this system, Russian aviation in Syria is able to deliver surgical strikes on the enemy's facilities, launching bombs at an altitude of 5–6 kilometers being in a cruise flight mode and out of reach for terrorists' man-portable air defence systems.

Now, the production output for air-delivered high-precision weapons is constantly increasing along with development and testing of several new models. For example, in September 2016, tests of the new flying bomb PBK-500U SPBE-K "Drel" were started. Over 10 new "air-to-surface" missiles and smart bombs are being developed to be installed inside internal weapon bays onboard the future Russian 5th generation fighter T-50 PAK FA and its export version FGFA.

RUSSIAN AEROSPACE FORCES' OPERATION IN SYRIA MAKES RUSSIAN HPW MORE ATTRACTIVE FOR THE GLOBAL ARMS MARKET

Any skeptical forecasts regarding Russian high-precision weapons were disproved by Russia's air operations in Syria launched a year ago. Starting from the first sorties, Russian aircraft largely used high-precision weapons as the territory controlled by terrorists was actually turned into a real firing ground for testing a wide arsenal of the newest models of HPW. The results of the application of high-precision munitions in Syria exceeded all expectations. Smart bombs and missiles hit different terrorist facilities, such as warehouses, militants' camps, fortifications, and underground command centers, providing the highest accuracy in any conditions, day and night.

In the course of the military operation in Syria, Russian weapons including high-precision munitions were shown to the best advantage. This heightened interest in Russian weapons and military equipment has already increased big backlogs of orders for Russian defence industry companies. The export future for different Russian air-delivered munitions is getting better and more promising as many various customers show their interest in these products. Many countries may be interested in an upgrade package for the existing Soviet combat aircraft, including the SVP-24 "Gefest" system, as this approach allows to substantially reduce costs of high-precision munitions. ◆

"REZONANS-NE"
New Generation Cognitive Integrated Radar System

- **Efir SHUSTOV**, *Director General of RC REZONANS CJSC, PhD (Engineering), Professor, chief designer of the IRS*
- **Alexander SHCHERBINKO**, *Deputy Director General of RC REZONANS CJSC, PhD (Engineering)*
- **Ivan NAZARENKO**, *Deputy General Director of RC REZONANS CJSC, Cand.Sc. (Engineering)*
- **Alexander STUCHILIN**, *Deputy Director General of RC REZONANS CJSC, Cand.Sc. (Engineering)*
- **Vyacheslav NOVIKOV**, *Technical Director of RC REZONANS CJSC*

IRS "REZONANS-NE" FOR THE VHF BAND IS INTENDED FOR EARLY DETECTION OF LOW-SIGNATURE AIRBORNE TARGETS AND IS A MULTI-FUNCTION ADAPTIVE COHERENT RADAR WITH A PHASED ANTENNA ARRAY, WHICH INCLUDES A COMPLEXED SECONDARY RADAR TO DETERMINE STATE AFFILIATION AND RECEIVE INFORMATION IN THE RBS AND THE MX-10, 12 MODES IN ORDER TO RESOLVE AIR TRAFFIC CONTROL PROBLEMS.

The system is a cognitive radar of new generation and is designed for efficient early detection of a broad class of modern and prospective airborne targets, including low-signature cruise and ballistic missiles, hypersonic aircraft, including those based on the "Stealth" technology, in terms of the electronic countermeasures and natural interference.

IRS "Rezonans-NE" has been developed on the basis of the latest achievements in the field of radar, computers, digital signal processing. It uses the physical principle of the resonant reflection of radio waves from airborne objects, which leads to a sharp increase of the effective reflecting surface. This effect allows negating the techniques to reduce the signature of aircraft and spacecraft.

The lead developer of the IRS "Rezonans-NE" is the RC REZONANS CJSC. Research center REZONANS was established in 1991 to accelerate the implementation of major works on the state order of the Ministry of Defence of the Russian Federation according to decree of Director of Research Institute of Long-Range Radio Communication (NIIDAR) No. 232, dated September 6, 1991.

In 1993, RC REZONANS was transformed into RC REZONANS JSC, in 1999 it was renamed into Research Center NIIDAR-REZONANS CJSC, and in 2009 – into Research Center REZONANS CJSC (RC REZONANS CJSC).

The main line of activity is the implementation of research and design and development works for the Ministry of Defence of the Russian Federation, in particular, research works on the creation of VHF radar placed in the airborne or ground vehicles. Since 1992, RC REZONANS CJSC has successfully completed six research works and three design and development works as the prime contractor and co-executor. As a result, the enterprise received more than 20 patents for its inventions.

The enterprise uses a quality management system and the Scientific and Technical Council.

Since 2002 RC REZONANS CJSC has been involved in military-technical cooperation with foreign customers through the mediation of ROSOBORONEXPORT JSC as an enterprise of the Ministry of Industry and Trade of the Russian Federation.

The main features of IRS include: absence of mechanical rotation of antennas; beam-formation of the radar system is performed using an innovative phased array antenna; beam-formation and beam agility is effected electronically in space.

THE RADAR SYSTEM PROVIDES THE FOLLOWING MAIN OBJECTIVES:

– early detection and tracking a wide class of airborne targets, including low-signature ones, manufactured with the use of "Stealth" technology, hypersonic aircraft and ballistic missiles;
– automatic detection of motion parameters of airborne objects (range, azimuth, altitude, speed);
– automatic recognition of a class of airborne objects of the following types: airplane, helicopter, hot-air balloon; cruise missile, hypersonic target; ballistic target;
single target – group target, maneuvering target – non-maneuvering target;
– automatic output of complexed radar information to users;
– identification friend or foe in IFF system 40D – work in Mk-XA (Mk XII) system modes used by NATO countries and the international air traffic control systems ICAO ATC RBC;
– automatic control and display of the status of the technical condition of subsystems and diagnostics of IRS faults.

IRS can be used as part of automated and non-automated units, other units of the armed forces, in order to provide intelligence radar information, as well as the information field radar during combat operations.

IRS "Rezonans-NE" is a product of high operational readiness developed on the principle of modular design. A significant number of simple repetitive units and components, the use of standardized production lines makes IRS "Rezonans-NE" technologically advanced and relatively cheap in manufacture. IRS features simplicity and low cost of operation and is easily accessible to the operating staff.

IRS is equipped with automatic functional monitoring and diagnosing the failure spot up to easily removable modules, air-conditioning, automatic fire alarm and fire-fighting systems and other service systems.

The computing system consists of a series of single-board quad-core 7th generation computers and software complex. A stand-alone power supply system consisting of two power plants in the 1E9M2-4 system is possible. IRS can be powered by an industrial network with a consumption capacity of 100 kW.

THE RADAR SYSTEM HAS THE FOLLOWING MODES OF OPERATION:

1st – designed to detect and track mainly aerodynamic targets (ADT);
2nd – designed to detect and track high-altitude, mainly ballistic targets (BT);
Upon detection, as well as upon performance of the criteria of detection and tracking, targets, such as ADT and BT, may be tracked in each of the operating modes.

IRS modes are controlled independently – from the operator's work station (in data receiving, processing and transmission unit), or remotely from a remote work station (up to 1,000 m).

It is important to emphasize that the implementation of original idea in metal and digits would have been impossible without the selfless work of scientists, engineers and technicians, software programmers, workers, fitters, without the close cooperation of many Russian enterprises.

Saransk Television Plant JSC (Saransk), FSUE Branch of FSUE NIIR – SONIIR (Samara), Instrument Systems CJSC (Moscow), Murom Radio Plant JSC (Murom), IVK JSC, Research & Production Corporation Lianozovo Electromechanical Plant PJSC (Moscow), RPTP Granit JSC (Ryazan) are among them.

High results of work have been marked by the prestigious "Golden Idea" award with diploma of the 1st degree of the Federal Service for Military-Technical Cooperation.

The mentioned "Golden Idea" award has been approved by the Federal Service for Military-Technical Cooperation, and is given primarily to those who contributed significantly to building the world class equipment.

The IRS "Rezonans-N" has been commercially produced to date for the defense of air borders of the Russian Federation, while in the "Rezonans-NE" version it is supplied to the other countries of the world. ◆

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ABOUT AEROSILA

AEROSILA IS A PUBLIC MULTI PROFILE COMPANY SIMULTANEOUSLY POSSESSING THE FACILITIES FOR HIGH INTENSIVE R&D AND OWN PRODUCTION PLANT. BEING ESTABLISHED IN 1939 AS DESIGN BUREAU FOR AUTOMATIC AIR PROPELLERS DEVELOPING, SINCE 1957 THE COMPANY HAS BEEN DESIGNING AND DEVELOPING AUXILIARY GAS TURBINE ENGINES (APU) TOO.

ACTIVITIES

Now **AEROSILA** specializes in designing and manufacturing:

- APU for aircraft and helicopters
- air propellers and propfans for aircraft
- lifting and propulsion mechanisms for hovercraft
- power converters for supersonic aircraft
- inflowing and exhaust fans, jet axial fans for tunnels and underground premises

Being the high-level integrator, **AEROSILA** coordinates creative efforts of developers for control systems, fuel devices, starting and ignition systems, heat exchangers, sensors, other aggregates and materials, organizes the formation of perspective requirements and sets long-term objectives.

QUALITY and **RELIABILITY** of our products have been proven by their users worldwide. The **EFFICIENT USE** of **AEROSILA's** products even at highly demanding parameters is guaranteed by our **LONG EXPERIENCE** in **DESIGNING** such products, **MODERN TECHNOLOGICAL FACILITIES** for manufacturing and testing, strict quality management system (**ISO 9001:2008, EN 9100:2009** standards) and a well organized technical support network.

AEROSILA FEATURES

- Full cycle of new product creating from scientific investigation to pilot production, tests and technical support
- Modern technology of full-scale production and wide production cooperation
- Mutually-beneficial kinds of cooperation and personnel approach to partners and customers
- Cooperation with the leading industrial institutes and design bureaus
- High professionalism of collaborators
- Continuous quality improvement, products/services developing and modernizing. Meeting customers' requirements is our main concern

ON CUSTOMERS' DEMAND AEROSILA PROVIDES:

- Customization of serial products to the customer's requirements
- Design and development of new products
- Localization of manufacture under license agreement

AIR PROPELLERS, PROPFANS AND HYDROMECHANICAL GOVERNORS

Air propellers and propfans ranging from 15 to 30,000 h.p. feature aerodynamic efficiency up to 0.9. The following characteristics have been achieved by virtue of implementing multi-blade conception and using light composite blades:

- Dimension & weight reducing
- Noise level reducing
- Design service life increasing & reliability improving
- Overhaul ability of composite blades with durability of repaired blade at a level of new one

The electronic control loop in propellers' automatic control system allows to implement the following:

- expanded set of control functions
- diagnostics
- propellers' phase-synchronization with additional noise level reducing

APUs

On the basis of the series of New Gen gas turbine engines their modifications are operatively created for new, advanced and modernized aircraft and helicopters.

APUs are equipped with the electronic system of control and adjustment (FADEC) and meet up-to-date requirements in dimension, weight and specific performance, noise level, emissions release, launch and operation altitude, fuel economy and maintainability.

Now the following improvements are being performed:

- advanced small size gas turbine engines
- board power units with increased electric power bleed including implementation of "electric aircraft" conception
- base gas generator for small size propulsion engine

LIFTING & PROPULSION MECHANISMS FOR HOVERCRAFT AND WIG AIRCRAFT

AEROSILA has developed and provides serial supply of air propellers and lift fans designed for creating an air cushion under ship body, direct and reverse thrust for high speed, maneuverability, landing and ship moving on the land.

Blades of propellers and fans with variable pitch are made from polymer composite materials.

INFLOWING/EXHAUST FANS, JET AXIAL FANS

AEROSILA has developed the series of high effective variable pitch fans for ventilation of tunnels and underground premises. ◆

AEROSILA

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Mobile Systems

MIDIVISANA LLC ESTABLISHED IN 1992 IS NOW A DIVERSIFIED SCIENTIFIC AND INDUSTRIAL ORGANIZATION.

According to interests of ministries and departments of military organizations from a number of countries, the company produces a wide range of systems, staff and special vehicles, mobile strategic, operational and tactical control centers on the base of variable and constant volume containers of modular type of own unique design on the chassis of any manufacturer, to customer's request. The company produces more than 150 various models and modifications of special (specialized) equipment and vans for the needs of the country.

THE SET OF STAFF MODULAR VEHICLES (CONSISTING OF FOUR MODULES) is designed to organize workplaces for senior management and operational staff of the mobile command and control centers and mobile situational centers in the absence or destruction of infrastructure.

The set is equipped with automated workstations (20–40) with individual (including interactive) and collective means of displaying information, telephone, radio and microcellular (trunking) communications (including satellite), video conferencing equipment. Everything is controlled via the automated system of multimedia equipment. The set has several stand-alone automation segments organized with Internet and Ethernet technologies.

The deployment time by crew of eight persons is 60–15 minutes. The working area in the deployed state is 100 m².

The set of staff modular vehicles (consisting of four modules)

The staff vehicle with variable volume body-container ("Makhaon")

THE STAFF VEHICLE WITH VARIABLE VOLUME BODY-CONTAINER ("MAKHAON") is used to create mobile control units of various levels used both independently and as a part of mobile command and control centers, situational centers, and other mobile units. The new generation of product includes a possibility to implement electromechanical (via remote control) deployment and teardown with a reduced crew (1–2 people – 20–10 min), allows to form ergonomic automated workstations with permanently mounted active and multimedia equipment.

The company has developed various versions of the body-container, which differ from the base one by composition and individual specifications of systems and equipment, furniture, quantity, geometry, and doors and windows arrangement.

THE MOBILE OPERATING-RESUSCITATION UNIT is designed to provide military personnel and civilians with specialized medical care during the rectification of consequences of natural disasters, major accidents, man-made and biological disasters or armed conflicts.

The unit includes the staff vehicle with a variable volume body-container (operating room, resuscitation room), a trailer with a constant volume body-container (auxiliary module, DGS), a pneumatic module (emergency room), a pneumatic module (intensive therapy).

The mobile operating-resuscitation unit

The mobile navigation and topographic system

THE MOBILE NAVIGATION AND TOPOGRAPHIC SYSTEM is designed for rapid automated solutions for the survey support of the troops at the operational-tactical and tactical level.

It can be used for the missile and artillery units, reconnaissance units, as well as for other law enforcement agencies and departments.

It solves the problem of monitoring, analysis and evaluation of the area in respect of surveying, as well as geo-information decision-making support.

The unit is equipped with a set of a real-time monitoring of the area based on the unmanned aerial vehicles, a hardware-software complex for processing, storage and replication of geospatial information, a set of geodetic instruments.

THE MOBILE NAVIGATION AND GEODETIC UNIT is designed to promptly perform the tasks on the topographic and geodetic preparation of troops combat employment areas, troops combat elements survey, video and photo shooting of terrain while conducting a topographic survey, determining plane coordinates and terrain elevation points along the routes of troops movements, solution of geo-information computational tasks, determining their own location with automatic display on the electronic terrain map using the integrated navigation equipment.

The unit is fitted with a set of equipment, a set of optical-electronic means of high-resolution, an integrated navigation and information complex, a set of geodetic instruments, a set of special software.

The mobile navigation and geodetic unit

The mobile printing complex

THE MOBILE PRINTING COMPLEX is designed for the in-the-field editing and publication of updated topographic and special maps, photographic documents of the area, combat graphic documents, and other printed documents, as well as operative reprint of individual sheets of topographic maps, registration, temporary storage and distribution of printed documents. It is equipped with modules of preparation for publication and printing, with the constituent system of large-format color high-performance printing, storage and finishing module, life support module, hardware-software complex for processing, storage and replication of geospatial information. ◆

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LOS TRAVEL	Az: 360° • El: -15° to + 75°

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LOS TRAVEL	Az: 360° • El: -30° to + 85°
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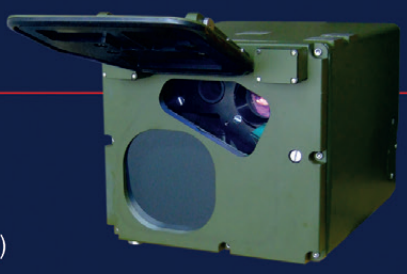
Optoelectronic Module MOE



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"Submarines of the Borei-class can deal with any missile defence system owing to their weaponry"
DMITRY ROGOZIN, DEPUTY PRIME-MINISTER

RUSSIA & USA. STRATEGIC NUCLEAR FORCES

NAVAL COMPONENT

The naval component of a modern nuclear triad is represented with nuclear submarines, which are one of the most impressive engineering developments and, at the same time, the most invisible national defence components operating in the silence of the deep sea.

Text
by Alexander Ermakov, independent military expert

In the USA, with the plainly obsolescent land and air components, SSBNs are currently playing the key role in order to ensure nuclear deterrence. So, 14 Ohio-class SSBNs are operational, plus four nuclear submarines of the same class modified into SSBN in 2002–2008 and able to carry up to 154 Tomahawk CMs. In the conditions of nuclear weapon reduction, a certain part of the Ohio-class submarines has been retrofitted because of their excessive firepower – these submarines have been armed with 24 solid-fuelled Trident II D-5 SLBMs, each of which may deliver eight low- or medium-power warheads (as a result of arms limitation; initially up to 12-14 warheads) within the maximum range of up to 11,000 km (probably, with small payload). As the START-III Treaty was signed, it was decided to reduce the amount of SSBN onboard launchers to 20; however, the biggest part of missiles is not fully armed – the average amount of munitions is four or five. According to the terms and conditions of the START-III Treaty, the parties should meet the requirements for the total amount of munitions only, but they may distribute them at their own discretion. In spite of these measures, by early 2018, when the parties should satisfy the terms and conditions of the START-III Treaty, the US SSBNs (the third part of deployed NW carriers – 240 of total 700) will take two thirds of munitions (approx. 1,100 of 1,550). At that, further reduction of the amount of submarines is not the best solution here as it will lead to a decrease in the amount of patrolling submarines (now, four-five submarines are on a patrol mission simultaneously).

The Ohio-class submarines will be replaced with new Columbia-class SSBNs (formerly known as SSBN-X or Ohio Replacement) by the early 2030s. It is planned to build 12 submarines armed with the same Trident II D-5 missiles (SLBMs are to be replaced only in the 2040s) in the amount reduced to 16. It is considered that a decrease in the amount of submarines and launchers would not have any effect on the total nuclear deterrence potential because new SSBNs will require rarer long-time maintenance while the operational capabilities

VICE-ADMIRAL CLIVE JOHNSTONE, COMMANDER OF NATO'S MARITIME COMMAND

«We see more activity from Russian submarines than we've seen since the days of the Cold War»

Project 667BDRM Delfin-class BMSs

"Even in spite of sanctions and pressure, Russian Navy is still continuing its active development"
CAPT. VASSILY DANDYKIN

«This platform is being designed for 42 years of service life. It has to survive into the 2080s and to provide a survivable, credible deterrent threat»
CAPT. DAVID GOGGINS, OHIO REPLACEMENT PROGRAM MANAGER ABOUT NEW COLUMBIA-CLASS SSBNS (FORMERLY KNOWN AS SSBN-X OR OHIO REPLACEMENT)

Rocket launch

K-535
Yury Dolgorukiy

K-117 Bryansk

Akula

of a lower amount of the Trident missiles exceed even the current limitations of the START-III Treaty. Further agreements related to arms reduction may make the USA reduce series production of these submarines or additionally decrease the amount of launchers.

Russia's strategic naval forces are now in the process of critical modernization that explains why they include various types of systems. For the time being, the Russian Navy operates BMSs developed during the Soviet period and the newest systems, such as:

– two Project 667BDR Kalmar-class BMSs: K-223 Podolsk and K-433 Svyatoy Georgiy Pobedonosets, both included in the Pacific Fleet. Another submarine – the K-44 Ryazan – is under repair; it is unclear whether it will be put into service or not;

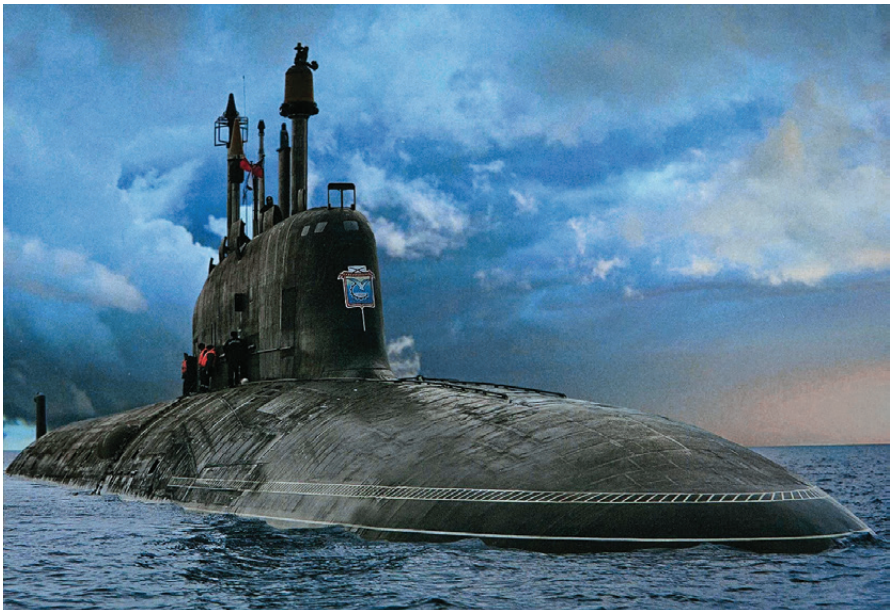
– five Project 667BDRM Delfin-class BMSs: K-18 Karelia, K-51 Verkhoturye, K-84 Yekaterinburg, K-117 Bryansk, K-407 Novomoskovsk, all included in the Northern Fleet. Another submarine – the K-114 Tula – is under repair that will be completed in the late 2016 – early 2017;

– three Project 955 Borei-class BMSs: K-535 Yury Dolgorukiy included in the Northern Fleet, K-550 Alexander Nevsky and K-551 Vladimir Monomakh included in the Pacific Fleet.

The Project 667BDR/BDRM submarines are direct evolutionary developments based on the first Soviet Project 667A BMS. Each BMS of this class is armed with 16 liquid-fuelled R-29RMU2 (RSM-54) Sineva SLBMs supporting up to 10 warheads, with the maximum range of 8,300–11,500 km, depending on arming options. These submarines are being rearmed with modified R-29RMU2.1 Liner missiles that feature new warheads and improved antimissile defence penetration systems. Modified Project 667BDRM submarines are likely to remain operational until the late 2020s. By that time, the program to replace them with advance next-gen BMSs (currently under development) should be launched.

Older BMSs that belong to other classes (including the famous huge Project 941 submarines) should be replaced with the Borei-class submarines being built. The

Missile silos



K-329 "Severodvinsk"

first three BMSs have already been handed over to the Navy, with additional four submarines being built and with the last 8th submarine, the keel-laying of which is to be started before the end of the year. The last five submarines will be built under the improved project; no accurate data on their design features is available, but the same weapon system is confirmed – 16 solid-fuelled R-30 (RSM-56) Bulava SLBMs, with six warheads and the range of up to 9,300 km. As a solid-fuelled missile, the Bulava SLBM offers the following advantages: potentially better ease of operation and compact structure (including reduced requirements for the submarine equipment), lower vulnerability to damage from antimissile systems. Although, speaking of the key parameter like the throw-weight-to-range ratio, this missile is inferior to the Sineva/Liner SLBM and its American equivalent. It should be noted that the throw-weight parameter loses its urgency due to arms reduction agreements while the range parameter has reached its logical limit long time ago. Nonetheless, the Bulava SLBM is likely to be replaced with a new missile in the foreseeable future.

After removing the Project 667BDR submarines from operational status and building all eight Borei-class submarines (to be completed in the early 2020s), Russia's strategic naval forces will include 14 BMSs. Their status within Russia's nuclear triad limited by the START III Treaty becomes questionable because the land component has always played the most important role. We should remember that under START-III Treaty's terms and conditions each SSBN is accounted as the amount of nuclear weapon carriers equal to the amount of SLBMs carried by each submarine, apart from a larger amount of munitions. Probably, this will either make Russian developers retrofit a certain part of the Project 667BDRM submarines into special-purpose submarines or take measures similar to those taken by American submarine developers, i.e. artificially reduce the amount of launchers or arm a part of SSBNs with strategic cruise missiles for naval applications that are undergoing their rebirth stage. ◆

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Photo 1

Nevskoe Design Bureau PJSC is the Only Designer of Aircraft-Capable Ships and Large Landing Crafts in Russia

NEVSKOE DESIGN BUREAU (NDB) PJSC IS A LEADING DESIGN BUREAU IN THE SHIPBUILDING INDUSTRY OF RUSSIA. IT IS A CENTRAL ENTERPRISE ON DESIGNING AND PRODUCING DOCUMENTATION FOR BUILDING, OPERATIONAL SERVICE, REFITTING AND MODERNIZING OF THE LARGEST AND MOST COMPLEX OCEANGOING WARSHIPS – AIRCRAFT CARRIERS AND LARGE LANDING CRAFTS, AS WELL AS SHIP'S AIR-TECHNICAL FACILITIES AND LANDING GEARS, TAKE-OFF SECTIONS OF SHORE-BASED TEST AND TRAINING FACILITIES OF SHIPBORNE AVIATION.

Since the middle of 1960s, one of the most important activities of the bureau has been design of large landing crafts. Built to NDB projects, fourteen ships of "Voronezhskiy komsomolets" class and three ships of "Ivan Rogov" class have successfully demonstrated the capabilities and potential of the bureau in solving such complex and complicated engineering problems as the construction of numerous special-purpose mechanisms typical for amphibious ships.

In 1980s NDB completed project design of the amphibious assault ship, which was capable not only to land the troops by means of helicopters, but also to land heavy armour using the stem gate, and assault landing crafts as well.

At present, the most recent amphibious ship project created by Nevskoe Design Bureau is project 11711 (*Photo 1*). (Currently the lead ship is undergoing trials and the second ship in series is under construction.)

The need for a new generation landing ship has arisen due to the emergence of new tactical requirements for modern amphibious operations that have to be fulfilled by the ship of given type.

On the basis of the project 11711 for Russian Navy, the NDB has developed a project of a large amphibious assault ship 11711E intended for export to the foreign customers. The large amphibious assault ship of project 11711E is designed to perform a variety of tasks both in wartime and in peacetime – from supporting the land forces in the conduct of operations on seaward flanks to transportation of various cargos in containers of international standard. The ship allows to transport present-day armored vehicles, including main battle tanks (MBTs), armored personnel carriers

Sergei VLASOV
General Director

Photo 2

Photo 3

(APCs), mechanized infantry combat vehicles (MICVs), mechanical transport as well as to effect evacuation of the sick, the injured and refugees, when emergency situations arise.

Unlike her foreign analogues, the 11711E project ship not only provides carrying of two helicopters with the capability of their employment in wintertime and using the helideck for the accommodation of assault vehicles, but also has fail-safe propulsion system and improved visibility from the bridge in course sector, when approaching the shore.

The characteristics of the ship, her armament and outfitting may be changed on the customer's request.

Since 1992, Nevskoe Design Bureau has been actively participating in international projects in the frames of military-technical cooperation with foreign countries.

The results of joint work with foreign customers have shown that the NDB proved itself as a reliable partner, capable of solving the most complex technical problems and organizational tasks. In particular, the challenging works on refitting "Admiral Gorshkov" heavy aircraft-carrying cruiser into "Vikramaditiya" aircraft carrier (*Photo 2*) for the benefit of the Republic of India and construction of shore-based test and training facility (SBTF) with takeoff and landing equipment for the Indian aircraft (*Photo 3*) have been accomplished among the NDB design projects.

In 2014 and 2015 Nevskoe Design Bureau PJSC was awarded the "Golden Idea" National Prize by the Russian Federal Military-Technical Cooperation Service for the development of "Vikramaditiya" aircraft carrier and SBTF projects. ◆

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